REGIONAL FORESTER'S SENSITIVE PLANTS
OF THE
OTTAWA NATIONAL FOREST

A summary of their life history, habitats, and status
for reference in preparing biological evaluations and other analyses

USDA Forest Service
Ottawa National Forest

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INTRODUCTION

As part of its multiple-use mission, the USDA Forest Service is concerned with the conservation of rare species. Rare species may include species designated as "threatened", "endangered", or "proposed" by the USDI Fish & Wildlife Service, or species designated as "Regional Forester's Sensitive" by the USDA Forest Service. The purpose for designating sensitive species is to ensure that species do not become federally threatened or endangered because of Forest Service actions, and to help maintain viable populations of all native and desired nonnative wildlife, fish, and plant species on National Forest System lands.

The USDI Fish and Wildlife Service and USDA Forest Service determine which "threatened" or "endangered" species occur on each National Forest. Currently, there are no such plant species documented to occur on the Ottawa National Forest (USDA Forest Service 2012).

Sensitive species are designated by the Regional Forester, and are thus called "Regional Forester's Sensitive Species" (RFSS). There are currently 605 species designated as RFSS within the Eastern Region (USDA Forest Service 2012). Of those, there are currently 51 species of plants documented to occur and designated as RFSS on the Ottawa National Forest. Some additional RFSS plant species, listed by another Eastern Region National Forest, are considered likely to occur on the Ottawa National Forest (see below). The list for the Eastern Region is avaible at http://www.fs.usda.gov/main/r9/plants-animals/plants and shows which national forests list which species.

Forest Service Manual 2672.4 directs the Forest Service to prepare biological evaluations for actions and programs authorized, funded, or carried out by the Forest Service. Biological evaluations disclose potential effects to listed species to decision makers and the public.

This document is intended to supplement biological evaluations on the Ottawa National Forest. A team of Forest Service botanists prepared the following accounts of Ottawa RFSS species, and regularly updates this document as new information becomes available. The document includes information that is used to make determinations in biological evaluations, such as the species legal status, habitat preference, prevalence and distribution on the Forest, global and state ranks, actions that could have a negative impact on the species, and related information. Our intent is to present detailed RFSS species information here, instead of repeating it in the biological evaluations.

In addition to Threatened, Endangered, and Sensitive (TES) species, the Forest Service is directed to collaborate with States and Tribes to meet objectives for species of concern. Those state-listed species which are not concurrently designated RFSS are not included in this document. Risk evaluations are prepared for all State-listed species documented to occur on the Ottawa National Forest, and those that are judged to be at risk on the Ottawa are listed as RFSS.

Definitions of Global, National, and State Ranks Used in the Document

NatureServe (2013) provides global ranks and defines them as shown below:

G1	**Critically Imperiled**—At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	**Imperiled**—At high risk of extinction or elimination due to restricted range, few populations or

	occurrences, steep declines, severe threats, or other factors.
G3	**Vulnerable**—At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	**Apparently Secure**—At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	**Secure**—At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

NatureServe (2013) provides national (USA) and state (Michigan) ranks and defines them as shown below:

N1 **S1**	**Critically Imperiled**—At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
N2 **S2**	**Imperiled**—At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
N3 **S3**	**Vulnerable**—At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
N4 **S4**	**Apparently Secure**—At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
N5 **S5**	**Secure**—At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

The following qualifiers may be applied to global, national, or state ranks (NatureServe 2013):

Rank	Definition
?	**Inexact Numeric Rank**—Denotes inexact numeric rank.
Q	**Questionable taxonomy that may reduce conservation priority**—Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The "Q" modifier is only used at a global level and not at a national or subnational level.

Definitions of Michigan List Status

The State provides definitions for endangered and threatened plants in Michigan:
Endangered: "Endangered species" means any species of fish, plant life, or wildlife that is in danger of extinction throughout all or a significant part of its range, other than a species of Insecta determined by the Department or the Secretary of the United States Department of the Interior to constitute a pest

whose protection under this part would present an overwhelming and overriding risk to humans (State of Michigan, 1994).

Threatened: "Threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (State of Michigan, 1994).

Michigan Natural Features Inventory provides a definition for special concern species:
Special Concern: "While not afforded legal protection under the Act, many of these species are of concern because of declining or relict populations in the state. Should these species continue to decline, they would be recommended for Threatened or Endangered status. Protection of Special Concern species now, before they reach dangerously low population levels, would prevent the need to list them in the future by maintaining adequate numbers of self-sustaining populations within Michigan. Some other potentially rare species are listed as of Special Concern pending more precise information on their status in the state; when such information becomes available, they could be moved to threatened or endangered status or deleted from the list" (MNFI 2013).

Definition of Coefficient of Conservatism (C)

This coefficient ranges from 0 to 10 and "represents an estimated probability that a plant is likely to occur in a landscape relatively unaltered from what is believed to be pre-European settlement condition (Herman et al. 2001). C of 0 means the plant has little fidelity to natural communities and can be found commonly in many sites. C of 10 means the plant is restricted to high quality natural areas. A higher number means the plant needs a specific quality habitat, and therefore may be more vulnerable. The coefficient is assigned by Herman et al. (2001) for the plant across the entire State of Michigan even though some plants may have different habitat requirements in the Upper Peninsula (UP) vs. the Lower Peninsula (LP).

LISTING OF THREATENED, ENDANGERED AND SENSITIVE SPECIES

The Eastern Region of the Forest Service revised its Regional Forester's Sensitive Species List in 2000 with minor revisions periodically since then. When the List was updated prior to the 2000 signing, National Forests were instructed to only analyze in project evaluations those species that are documented to occur within their respective Forest proclamation boundary. Subsequently, additional direction was given from Office of Inspector General to also consider those species that are likely to occur, even if not currently documented to occur. Taxa are determined "likely to occur" on the Ottawa if their range includes the Ottawa, their preferred habitat is present, and occurrences are known in the general vicinity of the Forest. In the table below, these species are denoted as LRFSS, while species that are documented and included on the List are denoted RFSS. Further, since new habitat and distribution information is frequently received, changes to the List are inevitable. Taxa that we are proposing for evaluation during the next update are designated as PRFSS. These are typically species that were considered likely to occur, for which we now have occurrences, and therefore need to evaluate (via a designated risk evaluation form) whether Sensitive Species status is appropriate. Risk evaluations for the taxa are filed with the Regional Office. Another substantive list revision occurred over the winter of 2010-2011, with finalization of the list on December 20, 2011 (USDA Forest Service 2012). This is the list used in this document.

Table 1. Regional Forester's Sensitive Plants, Showing Habitat on the Ottawa

Note the following additional abbreviations used in the table: SE = state endangered ST = state threatened SSC = state special concern RFSS = Regional Forester's Sensitive Species NA = not available NR = not ranked

SPECIES	COMMON NAME	STATUS	RANK (NatureServe 2013)			Coeff. C#	PRIMARY HABITAT on OTTAWA NF
			Glo-bal	Nat'l	State		
VASCULAR PLANTS							
Astragalus canadensis	Canadian milk-vetch	RFSS/ST	5	5	1-2	9	Stream banks of large rivers, often calcareous
Astragalus neglectus	Cooper's milk-vetch	RFSS/SSC	4	4	3	9	Stream banks of large rivers, often calcareous
Botrychium ascendens	trianglelobe moonwort	PRFSS	3	2-3	NR	NA	Open hardwoods
Botrychium hesperium	western moonwort	RFSS/ST	4	3	2	10	Swales, roadsides, other openings
Botrychium lunaria	common moonwort	LRFSS	5	4?	NR	7	Meadows, stream banks, shores, other openings
Botrychium minganense	mingan moonwort	RFSS	4-5	NR	NR	7	Mesic openings, woodlands, wetland edges
Botrychium mormo	litte goblin moonwort	RFSS/ST	3	3	2	10	Rich mesic northern hardwoods
Botrychium oneidense	bluntlobe grapefern	RFSS	4	4	NR	7	Mesic northern hardwoods, wetland edges
Botrychium pallidum	pale moonwort	LRFSS/SSC	3	3	3	10	Mesic openings, woodlands, wetland edges
Botrychium rugulosum	ternate grapefern	RFSS	3	3	3	6	Little-used woods roads, openings within hardwoods
Botrychium simplex	little grapefern	RFSS	5	5	NR	5	Openings, wetlands, shores, barrens, forest, disturbed ground
Calamagrostis lacustris	northern reedgrass	RFSS/ST	5	NR	1	10	Rocky areas
Callitriche hermaphroditica	northern water-starwort	PRFSS/SSC	5	NR	2	9	Shallow water of lakes and streams, shallow marshes
Calypso bulbosa	fairy slipper	RFSS/ST	5	NR	2	10	Coniferous wetlands

SPECIES	COMMON NAME	STATUS	RANK (NatureServe 2013)			Coeff. C#	PRIMARY HABITAT on OTTAWA NF
			Glo-bal	Nat'l	State		
Cardamine maxima	large toothwort	RFSS/ST	5	NR	1-2	10	Rich mesic northern hardwoods usually near ravines or rivers
Crataegus douglasii	black hawthorn	LRFSS/SSC	5	5	3-4	7	Rocky areas, borders, shore thickets, usually close to Lake Superior
Cypripedium arietinum	ram's head lady's slipper	RFSS/SSC	3	3	3	10	Coniferous wetlands or mixed coniferous-deciduous forest, usually over clay
Cypripedium parviflorum *v. makasin* *v. pubescens*	yellow lady's slipper	RFSS 5 5	 4? 4-5	 NR NR		 7 5	Mesic to dry forests, stream edges, lake shores, open and forested wetlands, prefers non-acid soils
Cypripedium reginae	showy lady's slipper	RFSS	4	NR	NR	9	Wet openings (such as within conifer swamps) with neutral or alkaline soils
Cystopteris laurentiana	St. Lawrence bladderfern	LRFSS/SSC	3	2-3	1-2	9	Rocky areas
Eleocharis olivacea	bright green spike-rush	LRFSS	4	4-5	NR	7	Open shores, mud flats, bogs
Erythronium albidum	white fawnlily	RFSS	5	5?	NR	7	Rich mesic northern hardwoods usually near large rivers
Galearis spectabilis	showy orchis	RFSS/ST	5	5	2	10	Moist spots in rich deciduous forest, apparently locally restricted to alluvial (generally clay or clay-loam) soil along the Ontonagon River in deep river valleys
Huperzia selago	fir clubmoss	RFSS/SSC	5	NR	3	10	Varied moist habitats including ditches, borrow pits, lakeshores, swales, openings in mixed forest, seepy meadows or cutbanks, conifer swamps, along old roads, rocks or cliffs

SPECIES	COMMON NAME	STATUS	RANK (NatureServe 2013)			Coeff. C#	PRIMARY HABITAT on OTTAWA NF
			Glo-bal	Nat'l	State		
Juglans cinerea	butternut	RFSS	4	3-4	3	5	Hardwoods, riparian forests
Juncus stygius	moor rush	LRFSS/ST	5	NR	1-2	10	Bogs, fens, openings in coniferous wetlands
Littorella uniflora	American shoreweed	RFSS/SSC	5	3	2-3	10	Soft water lakes
Lycopus virginicus	Virginia water horehound	RFSS/ST	5	5	2	8	Floodplains of larger rivers
Malaxis brachypoda	white adder's-mouth orchid	LRFSS	4Q	4	NR	10	Coniferous wetlands, other wet areas
Mimulus guttatus	seep monkey flower	RFSS/SSC	5	5	1	8	Springy areas, seepy woods
Moehringia macrophylla	largeleaf sandwort	RFSS/ST	5	NR	1	10	Rocky areas
Muhlenbergia uniflora	bog muhly	RFSS	5	NR	NR	8	Lakeshores, wetland edges
Neobeckia aquatica	lakecress	LRFSS/ST	4?	4?	2	8	Lakes, backwaters
Nuphar pumila	yellow pond-lily	RFSS/SE	5	3-5	1-2	10	Lakes, ponds
Panax quinquefolius	American ginseng	RFSS/ST	3-4	3-4	2-3	10	Rich mesic to wet northern hardwoods
Petasites frigidus var. sagittatus	arrowleaf sweet coltsfoot	RFSS/ST	5	NR	1-2	10	Non-forested wetlands
Phegopteris hexagonoptera	broad beech fern	RFSS	5	5	NR	8	Mesic northern hardwoods
Piptatherum canadense	Canadian ricegrass	LRFSS/ST	5	2	2	9	Dry (to mesic?) sandy upland forest of jack pine, red pine, and quaking aspen or openings within these
Polygonum careyi	Carey's smartweed	RFSS/ST	4	NR	1-2	9	Disturbed wet areas, stream banks, marshes, ditches
Potamogeton confervoides	Tuckerman's pondweed	LRFSS/SSC	4	3-4	3	10	Soft water lakes, peatlands
Prosartes hookeri	drops of gold	RFSS/SE	5	3-4	1	10	Cooler mesic northern hardwoods, often near drainages (apparently restricted to north of Hwy. M-28)

SPECIES	COMMON NAME	STATUS	RANK (NatureServe 2013)			Coeff. C#	PRIMARY HABITAT on OTTAWA NF
			Glo-bal	Nat'l	State		
Pterospora andromedea	woodland pinedrops	RFSS/ST	5	NR	2	10	Upland coniferous forest, usually over clay but one site over sand
Pyrola asarifolia	liverleaf wintergreen	RFSS	5	NR	NR	8	Coniferous wetlands, other wet areas
Pyrola minor	snowline wintergreen	LRFSS	5	NR	NR	10	Thickets, conifer woods, usually near Lake Superior
Ranunculus gmelinii	Gmelin's buttercup	RFSS	5	NR	NR	10	Edges of water bodies, wetland pools
Ranunculus rhomboideus	Labrador buttercup	RFSS/ST	5	NR	2	9	Rocky areas
Salix pellita	satiny willow	RFSS/SSC	5	NR	NR	10	Shores, stream banks, thickets, rocky wet areas
Silene nivea	evening campion	RFSS	4?	4?	NR	NA	Open banks and terraces of large rivers (e.g. Ontonagon)
Sisyrinchium montanum var. *montanum*	strict blue-eyed grass	RFSS/SSC	5	NR	NR	10	Dry to moist open sites
Thelypteris noveboracensis	New York fern	RFSS	5	5	NR	5	Moist hardwoods, often near streams, seeps, and swamps; - apparently restricted to east side of Ottawa
Tiarella cordifolia	heartleaf foamflower	PRFSS	5	5	NR	9	Mesic hardwoods and moist areas within woods
Utricularia geminiscapa	hiddenfruit bladderwort	PRFSS	4-5	4-5	NR	8	Soft water lakes, bog pools
Vaccinium cespitosum	dwarf bilberry	RFSS/ST	5	NR	1-2	9	Openings within conifer or mixed forest
Viola novae-angliae ssp. *grisea*	New England violet subspecies	RFSS/ST	4*	NR*	2*	10*	Open grassy areas in or at the edge of jack pine stands
Viola novae-angliae ssp. *novae-angliae*	New England violet subspecies	RFSS/ST	4*	NR*	2*	10*	Rock crevices along cold, rapidly flowing streams

SPECIES	COMMON NAME	STATUS	RANK (NatureServe 2013)			Coeff. C[#]	PRIMARY HABITAT on OTTAWA NF
			Glo-bal	Nat'l	State		
Zizia aptera	meadow zizia	RFSS/ST	5	5	1-2	9	Dry to moist open sites, may favor calcareous soils
[#]C from Herman et al. 2001							
*ranks and C are for the species level of *Viola novae-angliae.*							

LICHENS	(Ranks and C are generally not available for non-vascular plants)		
SPECIES	**COMMON NAME**	**STATUS**	**PRIMARY HABITAT on OTTAWA NF**
Ahtiana aurescens	yellow ribbon lichen	RFSS	Mature to old growth forested wetlands
Anzia colpodes	anzia lichen	RFSS/SE[1]	Trunks of hardwood trees in deciduous forest, often high up; possibly requires old growth
Caloplaca parvula	firedot lichen species	RFSS	Deciduous wetlands near lakes
Stereocaulon pileatum	snow lichen	RFSS/ST[1]	On rocks, sunny or partially shaded locations, often near water
Sticta beauvoisii	Beauvois' spotted felt lichen	RFSS/ST[1]	Shaded mossy rocks and bark
Usnea longissima	beard lichen	RFSS	Mature to old growth coniferous wetlands
BRYOPHYTES (Mosses and Liverworts)			
Frullania selwyniana	liverwort species	RFSS	Bark of white cedar in mesic, sheltered locations
Orthotrichum ohioense	Ohio orthotrichum moss	RFSS	Smooth hardwood tree bark in mesic forests, especially near streams
Pylaisiadelpha tenuirostris	pylaisiadelpha moss	RFSS	Sheltered habitats, including rock (usually acidic), trunks and bases of trees, rotten logs and stumps
Schistostega pennata	schistostega moss	RFSS	Caves, cliff crannies, cavities in tip-up mounds and other dark places
[1] Proposed state designation for lichens from Fryday and Wetmore (2002)			

REGIONAL FORESTER'S SENSITIVE PLANTS

In the following sections, brief descriptions only of the rare plants are provided; diagnostic characters and a detailed description, such as used to confirm plant identity, are not included in this document. Contact the Ottawa National Forest botanists if you need help identifying a rare, common, or invasive plant.

Species are grouped by vascular plants (flowering plants, ferns, and fern-allies) and non-vascular plants (mosses, liverworts, and lichens), and then listed alphabetically. Within the biological evaluations, species are often discussed together by habitat rather than alphabetically. For descriptions of plant communities see Kost et al. (2007).

Vascular Plants

***Astragalus canadensis* (Canadian milk-vetch)**
Family: Fabaceae (bean or pea)
Ottawa plants are variety *canadensis.*

This is a tall perennial (to 4 feet), growing from a rhizome, with branched stems. Leaves are compound, with 15-35 small elliptical leaflets (MNFI 2013). The flowers are whitish-yellow, ½ inch long, clustered in long spikes above the leaves. Fruits are 2-chambered, inflated pods (MNFI 2013, UWSP 2013).

Life History
This vetch is perennial, with flowers in July-August (UWSP 2013).

Habitat
Voss and Reznicek (2013) describe the habitat in Michigan as "dry prairies, moist shores, river banks, marshy ground, and other open or partly shaded ground." Chadde (1999) gives the preferred habitat in the Upper Peninsula as alvars and dry prairies, also occuring in moist meadows, streambank thickets, and lakeshores. UWSP (2013) reports this plant can occur in full to partial sun.

Distribution
This vetch is found throughout most of North America, and is common in much of its range (NatureServe 2013).

Ottawa NF Distribution
Ottawa populations occur only in Ontonagon County, with eight documented, all from clay soils along riverbanks of the Ontonagon River, in the deep river valleys near Military Hill. Populations are documented from the eastern Upper Peninsula in Alger and Delta counties (MNFI 2013).

Threats
Competition with non-native invasive or aggressive native plants, and mass wasting in the steep riverine habitat threaten populations.

***Astragalus neglectus* (Cooper's milk-vetch)**
Family: Fabaceae (bean or pea)
This is a tall herb with hollow stems and taproot. Leaves are compound, with many small elliptical leaflets. Flowers are whitish to green-white, about ½ inch long, in spikes above the leaves. Fruits are

straight, inflated pods held erect (UWSP 2013), thicker than the pods of *A. canadensis*, which which *A. neglectus* can occur (NatureServe 2013).

Life History
This vetch is perennial. Most populations are small (NatureServe 2013).

Habitat
This vetch occurs in marshy to dry open sites, such as clearings, shores, thickets, and riverbanks (Voss and Reznicek 2013). Sites often are calcareous (Voss and Reznicek 2013). Ottawa sites are small openings surrounded by white cedar, white spruce, and balsam fir on Ontonagon clay, which is more alkaline than most Ottawa soil types.

Distribution
The historic range included western New York and Ontario south to Virginia, and west through Ohio, Michigan, Wisconsin, Minnesota, eastern North and South Dakota, and southern Manitoba (NatureServe 2013). Currently, it is most common in Minnesota (NatureServe 2013).

Ottawa NF Distribution
There are four documented populations on the Ottawa, and another nearby population just outside the Forest, all on clay soils in Ontonagon River valleys near Military Hill. The plant is documented in four other UP counties, Menominee and farther east.

Threats
This vetch needs some disturbance, but not too frequent. Thus changes in the hydrologic regime where it occurs or too frequent mowing or brushing could be detrimental, as could natural succession. Use of herbicides to control exotics can be damaging to this species as can non-native invasives which may out-compete the vetch. Habitat loss is also a threat (NatureServe 2013).

Botrychiums
These ferns are notoriously difficult to identify; only minimal descriptions are given here as the distinctions are technical.

***Botrychium ascendens* (trianglelobe moonwort, upward-lobed moonwort)**
Family: Ophioglossaceae (adder's-tongue)

This is a small fern, with upward pointing, narrowly triangular pinnae. Lobe margins are lacerate and the frond is yellow-green (NatureServe 2013).

Life History
Like other *Botrychiums*, this is a small perennial fern sending up one frond per year, in late spring to midsummer (Wagner and Wagner 1993). In Minnesota (whereit is ranked endangered) plants are documented from transition meadows between forest and lake shores, as well as old iron tailings ponds, growing in sparse to dense cover of grasses, forbs and small shrubs (Farrar 2011). The putative Ottawa location is from a depression within hemlock-hardwood forest, growing with other *Botrychium* species.

Habitat
This fern may occur in grassy fields and is often found with *B. crenulatum, B. lunaria* and *B. minganense* (Wagner and Wagner 1993). The putative Ottawa location is in hardwoods.

Distribution
This fern occurs in the western US, and Canada, Ontario and Quebec, and Minnesota (USDA PLANTS 2013).

Ottawa NF Distribution
One fern was found in 2012 on the Ontonagon District, which, by photograph, is thought to be *B. ascendens* by D. Farrar, moonwort expert at Iowa State University. Confirmation is needed.

Threats
Light and moisture regime changes and impacts to the ground flora, as well as competition, are likely threats.

***Botrychium hesperium* (western moonwort)**
Family: Ophioglossaceae (adder's-tongue)
This fern is under expert taxonomic review and is sometimes referred to as *B. michiganense.*

The sterile frond is triangular, with basal pinnae pairs more separated along the stem than the other pinnae, and larger.

Life History
Spores are released in late summer to the soil where gametophytes are formed. This species may be able to remain dormant in drought years (Penskar and Higman 1999b).

Habitat
Habitats include sand dunes and moist jack pine forest in interdunal swales; grassy roadsides and old roads or trails; sandy fields; abandoned orchards; and other open areas (Chadde 1999; Penskar and Higman 1999b). These areas are often subject to low-level disturbance. Previously *B. hesperium* was also reported to occur in mature to old-growth hardwoods in the western Upper Peninsula (Penskar 1993); this may have been due to confusion among *Botrychium* species. Associates include other *Botrychium* species, jack pine, *Epigaea repens, Gaultheria procumbens*, *Vaccinium angustifolium, Aster macrophyllus, Pteridium aquilinum, Aralia nudicaulis* and *Maianthemum canadensis* (Chadde 1999).

Distribution
This fern has a divided distribution, occurring in the western US and Canada and in the Midwest—Michigan, Wisconsin, Minnesota, and Ontario (USDA PLANTS 2013).

Ottawa NF Distribution
The Ottawa NF has three records of *B. hesperium*. Two are from 1989 and 1992 and we have been unable to relocate any *B. hesperium* at those sites. Two new locations found in 2012 and 2013 may be *B. hesperium* ; we are waiting for confirmation by fern experts.

Threats
Succession, competition and drought may threaten this plant.

***Botrychium lunaria* (common moonwort)**
Family: Ophioglossaceae (adder's-tongue)

The sterile frond has fan-shaped, nearly overlapping pinnae with palmate venation (MN DNR 2013).

Life History
One leaf appears each year, dying after spores are released in mid to late summer. Plants may not appear above ground every year (MN DNR 2013).

Habitat
Common moonwort is found in grassy meadows and open fields, sandy and gravelly lakeshores and stream banks, and occasionally in forests (Cody and Britton 1989; Wagner and Wagner 1993; PVA 2000). Habitats may include slight, well-healed, past disturbances (PVA 2000). This fern may have a preference for calcareous substrates (MFO 2011).

Distribution
This fern occurs in much of the US and Canada, except for states including Iowa, Illinois, Indiana, Ohio and others to their south (USDA PLANTS 2013).

Ottawa NF Distribution
MFO (2011) shows occurrencs in the central and eastern UP and northern LP. Populations are documented from the Hiawatha National Forest to the east (Chippewa County) but there are no documented sites on the Ottawa National Forest. In Wisconsin, *Botrychium lunaria* is documented from Ashland, Bayfield, and Door counties (Wisconsin State Herbarium 2013).

Threats
Succession, competition, changes in moisture and light regimes and herbivory are potential threats.

***Botrychium minganense* (Mingan moonwort)**
Family: Ophioglossaceae (adder's-tongue)

This moonwort has a narrow, nearly linear frond (MFO 2011).

Life History
One leaf appears each year, dying after spores are released.

Habitat
Lellinger (1985) describes the habitat as "meadows, prairies, and woods and on sand dunes and riverbanks, in acid to circumneutral soil." Chadde and Kudray (2001) report habitat in Minnesota as maple-basswood forest, transition areas to wetlands, sandy shorelines, and wet cedar woods. In Wisconsin, the fern has been found in rich hardwoods, the fluctuating shoreline of a seepage lake, and in a Lake Superior dune community (USDA Forest Service Chequamegon-Nicolet NF 2002). This fern often occurs with *B. lunaria* (Cody and Britton 1989).

Distribution
This fern occurs in much of the US and Canada, except for states including South Dakota, Iowa, Illinois, Indiana, Ohio and others to their south (USDA PLANTS 2013).

Ottawa NF Distribution
MFO (2011) shows occurrences in the central and eastern UP and northern LP. The fern is documented on the Hiawatha and the Chequamegon-Nicolet National Forests. On the Ottawa, there is one reported historic collection but no site data is available other than "rich hardwoods." An attempt to relocate the population in 2010 was unsuccessful. A 2013 collection may turn out to be this species.

Threats
Succession, competition, changes in moisture and light regimes and herbivory are potential threats.

***Botrychium mormo* (little goblin moonwort)**
Family: Ophioglossaceae (adder's-tongue)

Plants are very small, lighter green, succulent, and often hidden in leaf litter. Pinnae are not well developed and can appear sunken (MFO 2011; Penskar and Higman 1996a).

Life History
Fronds emerge in late summer with spore release in the fall. Some plants do not emerge above ground or above the leaf litter layer every year (Penskar and Higman 1996a).

Habitat
Habitat for *B. mormo* consists of a rich duff layer in shaded forest floors under mid-aged or older deciduous forest, dominated by northern hardwood species and with a relatively closed canopy (Casson et al. 2002; Wagner and Wagner 1993). Common associates include sugar maple, yellow birch and basswood trees, *Lonicera canadensis, Carex intumescens, Caulophyllum thalictroides, Allium tricoccum, Asarum canadense, Trillium grandiflorum*, and *Aralia nudicaulis* (Chadde 1999; Higman and Penskar 1996a).

Distribution
This fern is restricted to the northern forests of Minnesota, Wisconsin, Michigan, and Quebec (USDA PLANTS 2013).

Ottawa NF Distribution
There are four documented sites on the Ottawa National Forest, all from mesic northern hardwoods, and all in southern Gogebic County or the McCormick Wilderness in Baraga and Marquette Counties. Recent revisits to the three Gogebic County sites have not located any *B. mormo.* Other populations are documented in the eastern Upper Peninsula, northern Wisconsin, and Minnesota (MFO 2011; MN DNR 2013; UWSP 2013).

Threats
The major threats to *B. mormo* across its range include impacts to the soil and duff layers, such as compaction and drying, which may occur from forest canopy removal, heavy equipment use over soil, construction of roads, houses, etc., or from non-native earthworms. These worms are not native to the northern glaciated regions, including all of the Ottawa NF. *B. mormo* populations and habitat are currently threatened by these worms, which have colonized hardwood stands following introduction from various sources. These worms utilize the duff layer, in some cases removing it entirely, thereby making the stand unsuitable for the fern, since the fern needs mycorrhizal associations that are only possible in the duff layer. A study by John Almendinger (1998) on the Ottertail Peninsula in Minnesota found that worm-infested plots show decreases in typical hardwood understory plants including

Uvularia grandiflora, Polygonatum pubescens, Aralia racemosa, Botrychium virginianum, Osmunda claytonii, Asarum canadense, Anemone quinquefolia, and *Viola* species, as well as others. In Minnesota, some *B. mormo* sites appear to have been extirpated by worms (Casson et al. 2002).

The USFS Eastern Region *Botrychium mormo* Conservation Approach recommends eliminating activities that threaten *Botrychium mormo* populations, managing the habitat of known sites to promote a high likelihood of persistence, and making efforts to control or minimize the spread of exotic earthworms (Casson et al. 2002).

***Botrychium (Sceptridium) oneidense* (bluntlobe grapefern)**
Family: Ophioglossaceae (adder's-tongue)

This grapefern has a single broadly triangular leaf. Terminal leaf segments are obtuse to rounded (MN DNR 2013).

Life History
Leaves stay green through winter with new leaves appearing the next summer and the old ones dying back. Fertile fronds are not produced every year (MN DNR 2013).

Habitat
Wagner and Wagner (1993) give the rangewide habitat *for B. oneidense* as, "moist, shady, acidic woods and swamps." MFO (2013) lists the habitat as "understories of swampy to dry sandy hardwood or mixed forests, occasionally in conifer swamps."

Distribution
This is a fern of the NE US and Canada (USDA PLANTS 2013).

Ottawa NF Distribution
There are seven putative populations on the Ottawa National Forest, found from 2001 to 2012. All are in mesic northern forest, three of them in old logging roads within the forest. Some have not been verified. Four could not be relocated in searches in 2013.

Threats
Changes in forest floor, moisture regime and canopy opening may be detrimental.

***Botrychium pallidum* (pale moonwort)**
Family: Ophioglossaceae (adder's-tongue)

This is a small fern, whitish-green, with few pinnae, often folded, and with palmate venation (MN DNR 2013).

Life History
B. pallidum can live underground in an immature stage for several years before forming an above-ground frond and producing spores (MN DNR 2013).

Habitat
MFO (2013) gives the habitat as "under trees and shrubs in more open habitats, also in forest understories, in sandy soils." MN DNR (2013) describes the plant as occurring in a diversity of habitats, from open to forested.

Distribution
Botrychium pallidum has a sporadic distribution including parts of Canada, Colorado, Maine, Minnesota, Wisconsin, and Michigan (Wagner and Wagner, 1993).

Ottawa NF Distribution
No populations have been documented on the Ottawa. There are populations documented in the central and eastern UP (MFO 2013). One population is documented in Northern Wisconsin (UWSP 2013). Several occurrences are mapped in northern Minnesota (MN DNR 2013).

Threats
According to the Conservation Assesment (Chadde and Kudray 2001), the primary threat to *B. pallidum* appears to be loss of its open, grassy habitat to successional overgrowth. This species' preference for disturbed, open habitat may lead population viability to be dependent on a shifting mosaic of suitable sites opening for colonization, as occupied sites become overgrown and their generally small populations become vulnerable to local extinction.

***Botrychium (Sceptridium) rugulosum* (ternate grapefern, St. Lawrence grapefern)**
Family: Ophioglossaceae (adder's-tongue)

This fern has one triangular frond with very angular and finely toothed segments (MFO 2013). The leaf has a somewhat wrinkled (rugulose) aspect (MN DNR 2013).

Life History
Sporulation occurs later in the summer. The leaves persist through winter, dying back as the new fronds emerge the next summer (MN DNR 2013). It is often found in small populations, for example, 5-10 ferns (Wagner and Wagner 1993).

Habitat
MFO (2013) lists the habitat as "sandy fields and barrens, persisting in young forests"; the WI DNR (2013) describes the habitat as sandy shorelines of lakes and ponds; and the MN DNR (2013) lists "low, moist habitats in brushy or grassy areas and in open forest areas". Ottawa sites include the sides of woods roads in hardwood stands, and a sandy opening within a hardwood stand. Associated species at Ottawa sites include *Athyrium filix-femina, Viola* spp*., Rubus* spp., and other *Botrychium* species.

Distribution
This fern has a limited distribution in the northeastern US and Canada, with occurrences in Michigan, Wisconsin, Minnesota, New York, a couple New England states and NE Canada (USDA PLANTS 2013).

Ottawa NF Distribution
The Ottawa has records of four sites, all associated with old forest roads within mesic northern forest; two were not relocated in recent searches.

Threats
Canopy changes, herbivory, road construction or other land development are threats for this fern. It may need a certain level of canopy openness or disturbance to persist (MN DNR 2013).

***Botrychium simplex* (little grapefern, least moonwort)**
Family: Ophioglossaceae (adder's-tongue)

There are three varieties, varying by leaf shape. The single leaf can be thin to fleshy, undivided to lobed. The basal pinnae pair is usually the largest (MN DNR 2013). It is a highly variable grapefern with many environmental forms and juvenile stages (Wagner and Wagner 1993).

Life History
Like other *Botrychiums*, *B. simplex* is dependent on a mycorrhizal relationship. It is perennial, producing one leaf per year.

Habitat
B. simplex is found in a variety of open to shaded sites, such as old fields, wetland edges, meadows, lakeshores, ridges, bluffs, disturbed ground, barrens, floodplains, mesic northern forest, and conifer swamps (Farrar 2006; Wagner and Wagner 1993). It may occur in full sun or under the shade of taller plants. It may occur on dry to damp substrates. MFO (2013) gives the habitat as "fields, sometimes in more densely vegetated settings than other species, though often by logs and stumps, sandy forests; a slender variant called var. *tenebrosum* … occurs sparsely in mossy conifer swamps and mossy hummocks in deciduous swamps." The MN DNR (2013) suggests that habitats vary with the variety, with variety *simplex* more often found in open sites, var. *tenebrosum* in forest interiors, and var. *compositum* in open areas.

Distribution
This fern has a widespread distribution across much of North America (USDA PLANTS 2013).

Ottawa NF Distribution
There are apparently three documented locations on the Ottawa, although none have been confirmed by *Botrychium* experts. Two are in mesic northern forest and one does not have habitat information. *B. simplex* is documented in nearly all northern WI counties (UWSP 2013). Both *B. simplex* variety *simplex* and variety *tenebrosum* occur in our area.

Threats
Succession and changes in light and moisture regimes may threaten this fern.

***Calamagrostis stricta ssp. inexpansa* (*C. lacustris*) (northern reedgrass)**
Family: Poaceae (grass)
Taxonomy is questioned (MNFI 2013); Voss and Reznicek (2013) subsume *C. lacustris* into *C. stricta*.

This is a tall grass with narrow leaves and flowers in tight spikes (UWSP 2013).

Life History
This is a perennial, rhizomatous grass.

Habitat
Voss and Reznicek (2013) describe the habitat in Michigan as "fens, sedge meadows, interdunal swales, low dunes, and moist cobbly, sandy, or rocky shores, especially of the Great Lakes, often in calcareous habitats". Associates include *Comptonia peregrina, Arctostaphylos uva-ursi, Danthonia spicata*, and *Campanula rotundifolia* (Chadde 1999).

Distribution
The grass occurs across northern North America (USDA PLANTS 2013).

Ottawa NF Distribution
Michigan collections, including two Ottawa National Forest sites, are mostly from open rocky areas, and include sites in Iron and Houghton Counties. There are records from Keweenaw and Marquette Counties in the UP as well.

Threats
Threats are not well-known, but may include competition from exotics, herbivory, and changes to habitat such as succession or drought.

***Callitriche hermaphroditica* (northern water-starwort, autumnal water-startwort)**
Family: Callitrichaceae (water-starwort)

This is a slender, submerged aquatic plant with linear leaves and winged fruits (MNFI 2013).

Life History
This is an annual plant, ripening from seed produced late in the fall (MNFI 2013).

Habitat
This plant occurs in shallow water to 4 feet deep in lakes and streams, and can also occur on water edges or in shallow marshes (MNFI 2013; Voss and Reznicek 2012).

Distribution
This plant is found in much of the northern and western US and Canada (USDA PLANTS 2013).

Ottawa NF Distribution
There are three documented populations within the Forest boundary, two from Bond Falls Reservoir (private power company land) and one from a national forest stream. A fourth location (Cooks Run) turned out to be the more common water-starwort. Northern water-starwort is also documented in Iron and Keweenaw Counties in the western UP and in four eastern UP counties (none in LP) (MNFI 2013).

Threats
Changes in water flow and quality threaten this aquatic plant.

***Calypso bulbosa* (fairy slipper)**
Family: Orchidaceae (orchid)
Ottawa plants are variety *americana*.

Calypso occurs as single stems from a bulb, to about 6 inches tall. There is one flower per stem, and it is pinkish purple to white, fading to salmon, about ¾ inch wide, and ½ to 1 inch long. The lip is hairy, yellow toward tip. There is one oval leaf at the base of the plant, 1-2 inches long.

Life History
This is a perennial orchid, flowering early in spring. After flowering, the leaf dies back and a new one emerges to persist thorugh the winter. Pollination requires assistance from bumblebees. Fruits develop mid-summer, but are uncommon. Vegetative reproduction may be more common (Higman and Penskar 1996).

Habitat
This orchid occurs in moist, shaded, generally mature coniferous forests, such as spruce-cedar-balsam fir swamps and bog forests. It also occurs in cedar-fir thickets along the Great Lakes shorelines (Case 1987), often in calcareous sites, and in boreal forests (Chadde 1999). It nearly always occurs in the shade (MNFI 2013). With suitable Great Lakes lakeshore lacking, potential habitat on the Ottawa NF is expected to be limited to conifer swamp habitats, boreal forest and calcareous sites. The latter two types are also very limited on the Ottawa. Fairy slipper is usually found not on soggy soil but elevated above the ground such as on micro-islands or stumps. Canopy cover is usually at least 60% and soil temperature below 15 °C (Caljouw 1981 in Higman and Penskar 1996b). Associates include *Oxalis acetosella, Mitella nuda, Trientalis borealis, Coptis trifolia*, and Sphagnum mosses.

Distribution
This orchid has a circumboreal distribution, occurring in south into Michigan, Wisconsin, and Minnesota in the Midwest (USDA PLANTS 2013).

Ottawa NF Distribution
There are three records from the Ottawa National Forest, all from cedar swamps. One of the sites, found in 1974 in Sylvania, appears extirpated. The two remaining sites are from one large white cedar swamp on the Iron River District, and have been observed in recent years.

Threats
Opening the canopy and thereby decreasing shade is the main threat to calypso survival. Herbivory by deer, rodents and slugs, collecting by orchid enthusiasts, and trampling by recreationists are also threats.

***Cardamine (Dentaria) maxima* (large toothwort)**
Family: Brassicaceae (mustard)

Stems rise from an underground rhizome, bearing 3 to 4 alternate leaves which are compound with three, ovate, toothed leaflets. Flowers are pink-white, 4-parted, at the top of the plant (Higman and Penskar 1999a).

Life History
This is a perennial spring ephemeral which is part of a variable hybrid complex, including *C. diphylla* (crinkleroot) and *C. concatenata* (cutleaf toothwort), and does not reproduce sexually or produce seeds (Higman and Penskar 1999a). Flowering occurs in May and the plants die back by early summer. It is one host for West Virginia white butterfly larvae.

Habitat
The toothwort occurs in rich, moist deciduous woods and ravines with sugar maple and yellow birch (Chadde 1999). Associates include *Allium tricoccum, Dicentra cucullaria, Claytonia caroliniana, Dentaria diphylla*, and *Arisaema triphyllum* (Chadde 1999).

Distribution
This plant occurs in the eastern US with Wisconsin and Michigan the only Midwestern states where it is found (USDA PLANTS 2013). All but one site in Michigan and Wisconsin is within 20 miles of a Great Lake, and many are near ravines or rivers.

Ottawa NF Distribution
Fifteen sites are documented on the Ottawa National Forest, from Gogebic and Ontonagon Counties, mostly from rich woods along large rivers.

Threats
Habitat loss, competition with exotics, and herbivory are the main threats.

***Crataegus douglasii* (black (Douglas') hawthorn)**
Family: Rosaceae (rose)

This is a small tree or shrub (to 13 feet), with oval leaves with shallow lobes and serrated margins, and short thorns. White, 5-petaled, flowers develop into purple-black fruits, this color being distinctive among Michigan hawthorns (MFNI 2013).

Life History
This shrub produces seeds in berries. The hawthorn has a shallow, diffuse root system and can re-sprout from the roots if the above-ground stems are removed (Habeck 1991).

Habitat
This shrub occurs on the borders of woods (mixed forest), in rocky woodlands, on rock summits, in dry open spots, and in thickets on sand dunes and shores (Voss and Reznicek 2013). It can be common locally (Voss and Reznicek 2013). Only the northern parts of the Ottawa NF near Lake Superior, like the Black River Harbor area, likely provide habitat for this shrub.

Distribution
This is a western species, extending into Michigan, Wisconsin and Minnesota in the Midwest. Michigan occurrences are primarily in the northern Upper Peninsula (MNFI 2013).

Ottawa NF Distribution
No natural populations are documented on the Forest. A population is mapped very near the Forest in Ontonagon County. Seeds have been collected at that site and raised into seedlings which were planted at Black River harbor.

Threats
Succession which allows the open habitat to close in may be detrimental as may herbivory.

***Cypripedium arietinum* (ram's head lady's slipper)**
Family: Orchidaceae (orchid)

This orchid has a 4-16 inch tall stem, with thin hairs, and narrow, lance-shaped, often folded, leaves along the stem. The lower leaves are like small scales, while the upper ones are more open, spiraling around and clasping the stem. There are a 3-5 leaves per stem. One flower is produced per stem. The flower pouch is triangular, 1/3 –1 inch, whitish with red streaks near the top, all reddish/purple/brown at the bottom. The mouth of the pouch has long hairs. The upper parts (sepals) are purplish-brown or brown, and may have green streaks (Brzeskiewicz 2000, Case 1987).

Life History
This orchid has a short flowering period, in late May to early June. Plants must be a certain height to flower, and not all mature plants flower every year (Penskar and Higman 1999). Pollinators include small bees. Vegetative reproduction is likely more common than reproduction from seed (Penskar and Higman 1999).

Habitat
Voss and Reznicek (2013) give the habitat in Michigan as "low dunes, in partial shade of fringing conifers, along the northern shores of Lakes Michigan and Huron and on Lake Superior(where it also occurs on thin soil over rock); inland, under jack pine and oak and also in coniferous swamps (cedar, tamarack, spruce, fir)".

Distribution
This is a northern orchid, extending south into Michigan, Wisconsin and Minnesota in the Midwest (USDA PLANTS 2013).

Ottawa NF Distribution
There are approximately 17 mapped populations on the Ottawa National Forest, all from cool mixed conifer/hardwood upland woods on steep slopes above the Ontonagon River branches.

Threats
The conservation assessment for *Cypripedium arietinum* (Brzeskiewicz 2000) notes that this species has long been considered rare, and there is a general lack of understanding of its conservation needs. Identified threats include deer browse, habitat loss by development, logging, forest fragmentation, collecting, and competition from exotics.

***Cypripedium parviflorum* (yellow lady's slipper)**
Family: Orchidaceae (orchid)
There are two varieties of yellow ladyslipper: variety *pubescens* has larger flowers (3-5 cm), while variety *makasin* has smaller flowers (2-3 cm). Both variety *makasin* and variety *pubescens* are included here and considered RFSS on the Ottawa. Most reported occurrences are small populations (NatureServe 2013).

The tall (to about 30 inches) stems are leafy with oval, ribbed leaves, clasping the stem and more or less in two ranks. The large and showy flowers have yellow lips with twisted green-brown sepals above

(UWSP 2013). There are 1-2 flowers per stem (Case 1987). The two varieties are distinguished by flower size, color of sepals, and habitat preferences (UWSP 2013).

Life History
Flowering occurs in May to July, depending on the site.

Habitat
These orchids are found in mesic to dry forests, stream edges, lake shores, and open and forested wetlands (Case 1987). They usually occur in neutral or subacid soils, and may be particularly abundant in limestone areas (Case 1987).

Distribution
This orchid has a widespread distribution in eastern North America and in both Michigan and Wisconsin (Case 1987; UWSP 2013; USDA PLANTS 2013). Variety *makasin* is limited to the more northern part of the range.

Ottawa NF Distribution
While this orchid has not previously been designated Sensitive on the Ottawa, and therefore not tracked, we are aware of approximately 8 populations. They are mostly in large river valleys such as along the Middle Branch Ontonagon River, where the more calcareous soils, steeper slopes limiting deer herbivory, or microclimate may be favorable.

Threats
Threats include habitat loss, canopy changes, hydrologic regime changes, deer herbivory, exotic invasives, and horticultural and medicinal collecting (NatureServe 2013).

***Cypripedium reginae* (showy lady's slipper)**
Family: Orchidaceae (orchid)

The stem is 16-40 inches tall, very hairy, with leaves along it. These leaves are oval, clasp around the stem, are hairy and have obvious ribs. The large flower pouch is 1-2 inches, not split along its length, pink, with redder streaks. The upper parts (petals and sepals) are white. There can be 1-3 flowers per stem (Case 1987; UWSP 2013).

Life History
This perennial orchid flowers in early June to mid-July (Case 1987). Seed germination is complicated, making propagation difficult.

Habitat
Needing sunlight and moisture, this orchid is found in wet open settings such as openings in conifer swamps, if they are not too acidic, or bogs or fens (Case 1987). It is usually in neutral or slightly alkaline soils (Case 1987).

Distribution
This orchid occurs across much of eastern North America, from Newfoundland to North Dakota, south to Arkansas and Tennessee (NatureServe 2013; USDA Plants 2013).

Ottawa NF Distribution
This orchid previously has not been designated Sensitive on the Ottawa, and therefore was not tracked; we are aware of about five populations, mostly from Ontonagon River valleys. These river valley populations may benefit from calcareous soils, steeper slopes limiting deer herbivory, or microclimate may be favorable.

Threats
Deer herbivory is known to be a threat to persistence of this orchid (Alverson et al. 1988; Gregg 2004). Changes in habitat such as canopy closure or full removal, changes in water regime, and collecting also threaten this orchid (NatureServe 2013).

***Cystopteris laurentiana* (St. Lawrence bladderfern, Laurentian fragile fern)**
Family: Dryopteridaceae (wood fern)

This is a small fern, with twice-divided ovate fronds, from creeping stems, growing in tufts. It has occasional glandular hairs, which distinguish it from the similar *C. fragilis* (FNA 2013).

Life History
This is a perennial fern, releasing spores in summer and fall (FNA 2013). It is a sexually-reproducing hybrid between *C. bulbifera* (diploid parent) and *C. fragilis* (tetraploid parent) (FNA 2013).

Habitat
This fern grows in rock cracks and ledges, often on calcareous rocks (Cody and Britton 1989; Haufler et al. 1993). MNFI (2013) suggests this fern is limited to granite and limestone outcrops in the western Upper Peninsula.

Distribution
This fern is found in northeastern North America (NatureServe 2013). In the Great Lakes area, it is restricted to upper Michigan, Wisconsin, and Minnesota (Haufler et al. 1993).

Ottawa NF Distribution
An occurrence is documented east of the Ottawa National Forest in Marquette County on wet seepy rocks within old-growth northern hardwood forest (MNFI 2013). Populations are documented in Wisconsin counties adjacent to the Ottawa National Forest (UWSP 2013), and on the Hiawatha National Forest (USDA Forest Service Eastern Region 2013), but no populations are documented on the Ottawa National Forest.

Threats
Canopy clearing or other disturbance affecting shade and moisture regimes can threaten this fern (MNFI 2013).

***Eleocharis olivacea* (*E. flavescens*) (bright green spikerush, capitate spike-rush)**
Family: Cyperaceae (sedge)
Ottawa plants are variety *olivacea* (USDA PLANTS 2013).

This is a small perennial spikerush to 28 cm (11 inches) (FNA 2013). The spikelet is wider than the stem. Stems are bright green and flattened (WI DNR 2013).

Life History
This is a perennial graminoid, flowering in June and fruiting in July (WI DNR 2013). It also reproduces by stolons.

Habitat
In Michigan this small spike-rush occurs in "moist sandy to muddy shores, exposed mud flats, bog mats; often in marly places and sometimes in several cm of water" (Voss and Reznicek 2012). Associates include *Eleocharis intermedia, Larix laricina, Picea mariana, Carex livida* (WI DNR 2013), and probably other emergent graminoids such as sedges and rushes.

Distribution
It occurs in eastern North America with disjunct occurrences in Wyoming and Texas (NatureServe 2013).

Ottawa NF Distribution
Sites are documented near the Ottawa in Houghton and Marquette Counties in Michigan (Voss and Reznicek 2012) and in Vilas and nearby counties in adjacent Wisconsin (where it is Special Concern (UWSP 2013), but this species has never been documented on the Ottawa.

Threats
Since this is an obligate wetland plant, changes in water regime are a threat, either flooding or drying.

***Erythronium albidum* (white fawnlily, white trout-lily, white dog-tooth violet)**
Family: Liliaceae (lily)

This 4-8 inch lily has 1-2 basal leaves, green with reddish-brown mottling. The flowers are white, 6-parted, funnel shaped, nodding, with one flower per plant (UWSP 2013).

Life History
The perennial plants appear in early spring and disappear by mid-June, like the more common yellow trout-lily. Plants can occur in large patches. Pollinators include bees and butterflies.

Habitat
The habitat is usually rich deciduous woodlands (such as northern hardwoods), especially in low areas and along floodplains (Voss and Reznicek 2012). Associates from the north Ottawa site include *Erythronium americanum* and other spring ephemerals. In northern Michigan and Wisconsin, *Erythronium albidum* appears to be mainly restricted to locations on major river corridors near Lake Superior.

Distribution
This lily occurs in much of the central and eastern US (NatureServe 2013).

Ottawa NF Distribution
This lily is common in lower Michigan and Wisconsin, but is rare here at the north edge of the species' range. There are three documented records from the Upper Peninsula: one from the Sturgeon River in Houghton County, north of the Ottawa; one from the Ontonagon River valley at the north end of the Ottawa; and one from the Cisco Branch of the Ontonagon.

Threats
Invasive garlic mustard may threaten this plant. Habitat disturbance is another threat.

***Galearis (Orchis) spectabilis* (showy orchis)**
Family: Orchidaceae (orchid)

This erect perennial is 4-8 inches tall, with stout to stubby stems. There are 1-10 pink to light purple flowers with white lips and large white spurs. There are two basal leaves, which are oval to elliptic, clasping the stem, and somewhat fleshy, not hairy. Below the flowers are dark green, leaf-like bracts which may make the stem look leafy (Case 1987; UWSP 2013).

Life History
This orchid emerges from a short, tuberless rhizome to flower in early spring (May to June) (Higman and and Penskar 1997).

Habitat
This orchid occurs in moist spots in rich deciduous forest and woodlots (Case 1987). Soils are often sandy clay or rich loam (Case 1987). Associates at the Ottawa's Ontonagon River site include *Anemone quinquefolius, Mitella nuda, Trillium cernuum, Urtica dioica, Thalyctrum dasycarpum,* and *Uvularia grandiflora*. Ground flora at this site is sparse, limiting competition, as orchids often prefer (Case 1987).

Distribution
Michigan is in the middle of the orchid's eastern deciduous forest range.

Ottawa NF Distribution
Upper Peninsula populations, documented from Gogebic, Ontonagon and Baraga Counties, are disjunct from populations in the southern half of the Lower Peninsula (Higman and Penskar 1997). One single plant has been found on the Ottawa National Forest, in 2005, from a flat river terrace on the north shore of the West Branch Ontonagon River in the shade of basswood and fir. Revisits to the site have been unable to find the orchid again. Other populations, some quite large, are known in Ontonagon County north of the Forest boundary. A population was recently found on private land in northern Gogebic County, close to Lake Superior. Populations are also documented in Ashland County, Wisconsin (Wisconsin State Herbarium 2013).

Threats
Threats may include canopy removal, changes in moisture regime, herbivory by deer and collection.

***Huperzia (Lycopodium) selago* (fir clubmoss)**
Family: Lycopodiaceae (club-moss)

This is a low creeping clubmoss, with sporgangia occurring in the axils of the leaves (MNFI 2013). The leaves are small and toothless, distinguishing this from *H. lucidula.*

Life History
Perennial fern ally, sporulating mid-summer.

Habitat
This northern clubmoss occurs in ditches, borrow pits, lakeshores, swales, openings in moist mixed forest, seepy meadows or cutbanks, conifer swamps, along old roads, and on rocks or cliffs (Wagner and Beitel 1993; MNFI 2013; Wisconsin State Herbarium 2013). Sites are open or partially shaded and moist to wet. Substrate is often sandy or rock. Some degree of disturbance may allow the plants to compete at these sites.

Distribution
This clubmoss occurs across Alaska and Canada, dipping into Minnesota, Wisconsin and Michigan and some northeastern states (USDA Plants 2013).

Ottawa NF Distribution
There are three documented observations of *Huperzia selago* on the Ottawa NF, from 1991 and 1998. Sites included a seepy hillside, an old logging road, and a slope along an intermittent stream. In 2003 all sites were resurveyed, but no *H. selago* was found. We question the original identification, since this plant is hard to identify. There are populations in several Upper Peninsula counties (MNFI 2013) and in three northern Wisconsin counties (UWSP 2013).

Threats
Ground disturbance and dessication are threats for this plant.

***Juglans cinerea* (butternut)**
Family: Juglandaceae (walnut)

Butternut is a medium-sized tree to 60 feet, with a short trunk with an open spreading irregular crown. Bark is thin, light gray and smooth on young trees, becoming interlacing ridges. Pith is chocolate brown. Leaves are alternate, pinnately compound with 11-17 leaflets (Barnes and Wagner 1981).

Life History
Butternut is shade intolerant and can only reproduce in openings without shade. Thus, seedlings will not develop under the parent tree. Good seed crops are only produced every 2-3 years, and seed production does not begin until about age 20. As young trees grow, they need to stay in the upper canopy to fully develop (Ostry et al. 1994).

Habitat
This tree occurs in mesic hardwoods, stream banks and bottomlands, swamp forests, and also on dry, rocky, limestone soils, with its native range generally to the south and east of the Ottawa (Barnes and Wagner 1981; Voss and Reznicek 2012).

Distribution
This tree occurs throughout the central and eastern US and southeastern Canada (NatureServe 2013).

Ottawa NF Distribution
There are three documented locations on the Ottawa NF, two of them persistent from plantings at old homesteads. The third site is one sapling growing along a road near some cabins on the Bessemer Ranger District. Associates include basswood, sugar maple and oak.

Threats
The viability of butternut in the United States is threatened by butternut canker (*Sirococcus clavigignenti-juglandacearum*), a non-native fungus that causes stem cankers (Ostry et al. 1994) that kill the tree. Reproduction requires soil disturbance which is not always provided. Wood is in demand by cabinet makers (NatureServe 2013).

***Juncus stygius* (moor rush)**
Family: Juncaceae (rush)
Ottawa plants are subspecies *americanus* (USDA PLANTS 2013).

This is a short rush with 1-3 basal leaves and 1-3 terminal flower heads (WI DNR 2013). The leaves do not have hard cross-partitions, helping to identify the species.

Life History
This is a rhizomatous perennial rush, blooming in June-July (WI DNR 2013).

Habitat
This species occurs in open to partially shaded conifer swamps and fens (MNFI 2013; WI DNR 2013). It may also occur in sedge-Sphagnum mats formed over alkaline lakes (MNFI 2013). It typically occurs as only a few scattered individuals (Chadde 1999). Associated species include black spruce, tamarack, *Chamaedaphne calyculata*, *Drosera rotundifolia*, *Calopogon tuberosus*, sedges, *Xyris montana, Utricularia* species, *Pogonia ophioglossoides, Arethusa bulbosa*, and sphagnum mosses (Chadde 1999).

Distribution
This species has an interrupted circumboreal range, dipping in our area into Minnesota, Michigan and Wisconsin (NatureServe 2013).

Ottawa NF Distribution
The Upper Peninsula is at the extreme southern fringe of the range of this circumboreal species. *Juncus stygius* is listed as RFSS and occurs on the Hiawatha and Chequamegon Nicolet National Forests, but it has never been documented on the Ottawa.

Threats
The main threats are changes to the hydrologic regime and habitat disturbance (MNFI 2013).

***Littorella uniflora* (*L. americana*) (American shoreweed)**
Family: Plantaginaceae (plaintain)

Littorella occurs as small basal rosettes of leaves in shallow water. The leaves are tapered and are stiff. Flowers are four-parted (Borman et al. 1997).

Life History
Submersed plants of this small, perennial, aquatic plant are sterile, although they can reproduce vegetatively by stolons and from their rhizomes (Voss and Reznicek 2012). When water levels recede, plants flower as emergents and are then wind-pollinated (Fassett 1957; Voss and Reznicek 2012).

Habitat

This plant occurs in sandy or mucky lakeshores and open water to over 1 m deep (Chadde 1998; Voss and Reznicek 2012). Lakes are typically soft water, low pH with low nutrient and dissolved carbon levels (Borman et al. 1997). Associates include *Lobelia dortmanna, Isoetes* spp., *Eriocaulon,* and *Juncus pelocarpus* (Voss and Reznicek 2012).

Distribution

This is a plant of the northeastern US and Canada, dipping into Michigan, Minnesota and Wisconsin in the Midwest (NatureServe 2013). It has been documented in most Upper Peninsula counties (MNFI 2013). Some populations may have been overlooked, as the sterile, more frequent, form is very small and below the water surface.

Ottawa NF Distribution

Littorella uniflora has been documented from three ONF lakes: Courtney Lake in Houghton County (1981), Clark Lake in Gogebic County (1981), and Langford Lake in Gogebic County (2007). Neither the Courtney Lake nor Clark Lake populations could be found in searches in summer 2009 or 2013. Thorough monitoring of Langford Lake has found a few plants of Littorella in 2007, 2008, 2010, 2011, and 2012 (Skogerboe 2012). J. Skogerboe noted that, despite looking for it, he never found more than *Littorella* fragments on rake toss observations (J. Skogerboe, pers. comm. 2013). Langford may have limited suitable habitat available for this plant: its average pH from records in 1965, and 1971-1978 was 7.4, not a low pH (Hellenthal and Dunlap 1997) as is typical for *Littorella uniflora*.

There are two documented populations off the Forest, but nearby. They date from 1966 and 1987 respectively, and there are no recent records to show if these populations are extant. The type of lake on/near the Ottawa most suitable for isoetids is sandy-bottomed oligotrophic lakes, such as several in the Sylvania Wilderness.

Threats

Borman et al. (2009) conducted research on the disappearance of isoetid plants from Wisconsin lakes. Isoetids are a guild of plants with particular adaptions such as a high root to shoot ratio, low leaf turnover, and efficient nutrient uptake from the sediment. *Littorella uniflora* is an isoetid as are *Lobelia dortmanna*, *Isoetes* spp., *Juncus pelocarpus*, *Elatine minima, Myriophyllum tenellum, Utricularia resupinata, Gratiola aurea,* and *Eleocharis* spp. The researchers found that isoetids are often associated with sandy shores of oligotrophic lakes or patches of this type of habitat in more eutrophic lakes (presumably the case in Langford Lake, which is not oligotrophic). With lake shoreline development, water chemistry changes, and increases in larger stature aquatic plants in a different guild (elodeids, including EWM), isoetids have been disappearing. Of particular relevance, Borman et al. (2009) found that lakes with higher water conductivities had greater invasion of the isoetid populations by elodeids and characeans (macroalgae such as *Chara* and *Nitella*). When conductivity in a lake crossed above a threshold of 20 µS/cm, guilds competing with the isoetids were more likely to be present. Lower conductivity is more favorable for isoetids, due to less water column bicarbonate availability for elodeids, while the isoetids get their carbon mainly from the sediments. Conductivity data from Langford Lake from 1971 to 1978 showed an average conductivity of 61 µS/cm, with all but one measurement above 43 µS/cm (Hellenthal and Dunlap 1997).

Borman et al. (2009) suggest that lake development, disturbance, and increases in non-isoetid plants may result in local extirpation of isoetids.

***Lycopus virginicus* (Virginia water horehound)**
Family: Lamiaceae (mint)

This mint has hairy, square stems and is aromatic. It can grow erect or leaning on other plants. Leaves are opposite, oval, and toothed. Flowers are whitish-blue, tiny, and four-lobed (UWSP 2013).

Life History
This perennial mint can reproduce vegetatively by runners from lower leaf nodes (and uncommonly from upper nodes of main stem) (Penskar 2010). It may be adapted to disturbance since it is mainly found in floodplains.

Habitat
The plant typically occurs in river floodplain forests in sun to light shade and is adapted to flooding and deposition cycles (Penskar 2010). Since it is a more southern species, it may be that only the Ottawa's larger river corridors would provide habitat.

Distribution
This perennial mint has a widespread distribution in eastern North America (USDA PLANTS 2011) but is only documented in five counties in the Lower Peninsula of Michigan (Penskar 2010). It is mostly absent from northern Wisconsin, except for two specimens from Bayfield County, with the notation "out of range" (UWSP 2013).

Ottawa NF Distribution
We learned in 2010 that some previously-collected Ottawa-area specimens were actually this plant and not the more common *L. uniflorus* as previously thought. There is one location documented within the Forest boundary, on non-national forest system lands.

Threats
Changes in hydrologic regime are the main threat.

***Malaxis brachypoda* (*M. monophylla var. brachypoda*) (white adder's-mouth orchid)**
Family: Orchidaceae (orchid)

One basal leaf clasps the stem, which bears tiny white flowers in a spike (UWSP 2013).

Life History
This is a perennial orchid, reproducing by seed. Flowering occurs in late spring to mid-summer. Pollination requires flies or gnats. Seeds are small and not carried far (MN DNR 2013).

Habitat
This plant is found in the shade in cold, wet soils in conifer swamps (cedar-balsam, tamarack, and fir-spruce), especially in wet depressions and where soils are marly (Case 1987). It may also occur in wet hardwoods bordering conifer swamps, along streams, near springs (Case 1987), or in moist jack pines (Newhouse 1993). Microsites may occur in animal trails, wet depressions or low pockets at the bases of old cedar trees (Case 1987), on hummocks, tip-ups, or mossy logs (Newhouse 1993). Case (1987) states that populations are "always local or spotty" and that the species is non-aggressive and non-competitive. Associates include mosses and sedges (Case 1987).

Distribution
This orchid is found across Canada and in the northern US (USDA PLANTS 2013). Populations are typically small (NatureServe 2013).

Ottawa NF Distribution
Sites are documented in the eastern Upper Peninsula, the Keweenaw Peninsula, Isle Royale (Case 1987), and the Chequamegon-Nicolet National Forest (USDA Forest Service 2007). There are no documented sites on the Ottawa National Forest.

Threats
Threats include canopy clearing, changes in moisture regime and deer herbivory.

***Mimulus guttatus* (seep monkey flower)**
Family: Scrophulariaceae (figwort)

This plant has erect branched stems to 2 feet. The opposite leaves are rounded, the upper with no stalk, the lower with short stalks. The flowers are bright yellow, snapdragon-like with two lips, 1-2" (Gleason and Cronquist 1991; MNFI 2013).

Life History
This plant can be perennial in permanently wet settings, and an annual in ephemerally wet settings. It can reproduce by seed and vegetatively by stolons (Van Kleunen 2007). Seeds have been collected at the Ottawa site, raised to seedlings in a greenhouse and successfully established in a rain garden on the Forest.

Habitat
Using the documented site for *Mimulus guttatus* in Michigan as an indicator, suitable habitat for this species could occur within any moist roadside ditch or any moist open forested or non-forested spot. Associates include *Impatiens capensis, Carex* spp., *Equisetum sylvaticum, Saxifraga pensylvanica, Mimulus glabratus* var. *jamesii*. MNFI (2013) describes the habitat as "in and along cold, calcium-rich springs, seeps, and streams".

Distribution
Gleason and Cronquist (1991) describe the status of *Mimulus guttatus* as "native mainly in the western cordillera, occasionally escaped from cultivation in our [northeastern US] range." Since the State listed *Mimulus guttatus* as Special Concern, the species could be assumed to be native to Michigan. However, Voss and Reznicek (2012) state "whether this is a native disjunct from western North America or an introduction is an open question". The species is very common in the west (Voss and Reznicek 2012).

Ottawa NF Distribution
This monkeyflower is a disjunct in the Upper Peninsula with one documented population (scattered along a roadside in the ditches and nearby wet areas) on the Ottawa National Forest.

Threats
Changes in hydrologic regime are the main threat.

***Moehringia (Arenaria) macrophylla* (largeleaf sandwort)**
Family: Caryophyllaceae (pink)

This is a small, erect perennial with lance-shaped, pointed, alternate leaves. Flowers are terminal, white and five-parted (UWSP 2013).

Life History
This is a perennial forb which can also reproduce vegetatively from rhizomes (WI DNR 2013).

Habitat
This herb occurs mainly on dry, sheltered, north-facing rock outcrops, often in crevices or moss mats and also in dry, rocky woods, outcrops, and plains (Chadde 1999; Voss and Reznicek 2012). It tolerates full to partial shade (Chadde 1999). Associates at Ottawa sites include sugar maple, white pine, red oak, ironwood, and *Athyrium filix-femina*, with scattered other herbs and mosses.

Distribution
The plant is widespread across western and northern North America (USDA PLANTS 2013).

Ottawa NF Distribution
Documented Upper Peninsula sites are in Keweenaw, Iron, and Marquette Counties. There are 16 documented populations on the Ottawa, all on rock outcrops, walls, or boulders, and all except one in McCormick Wilderness. Populations are also documented in Ashland and Iron Counties in Wisconsin (Wisconsin State Herbarium 2013).

Threats
Drought may result in negative habitat changes for some populations. Canopy closure and recreational uses of rock outcrops are additional threats.

***Muhlenbergia uniflora* (bog muhly or one-flowered muhly)**
Family: Poaceae (grass)

This grass is delicate and slender, with 1-2 flowers per spikelet (despite the name) conditions (Voss and Reznicek 2012).

Life History
This is a perennial grass, and wind-pollinated.

Habitat
This grass occurs in damp, sandy lakeshores, and meadows and swamp borders (Voss and Reznicek 2012). It occurs on a local basis but can become abundant under lowered water table conditions (Voss and Reznicek 2012).

Distribution
This grass occurs in the northeastern US and Canada, dipping into Michigan, Minnesota and Wisconsin in the Midwest, and having disjunct occurrences in Oregon and British Columbia (USDA Plants 2013).

Ottawa NF Distribution

Populations are documented across the Upper Peninsula, including Ontonagon, Gogebic, Houghton, and Baraga counties (Voss and Reznicek 2012) and northern Wisconsin (Wisconsin State Herbarium 2013). The first (and only to date) documented site of this species on the Ottawa NF was reported in 2004 from a moist sandy lakeshore.

Threats

Changes in water regime and shoreline development are the primary threats.

***Neobeckia aquatica* (*Armoracia aquatica, A. lacustris, Rorippa aquatica*) (lakecress)**
Family: Brassicaceae (mustard)

This is an aquatic plant with stems occurring underwater or floating, with fibrous roots along the stems (UWSP 2013). Submersed leaves are finely divided and tend to break up when lifted from the water (Voss and Reznicek 2013). Emergent leaves are lanceolate to oblong with toothed edges. The flower is 4-parted and white, with rounded petals. The fruit is an inflated oval pod with one seed chamber (UWSP 2013).

Life History

This mustard is perennial, primarily reproducing vegetatively from leaves and stem fragments which can form into new plants. It flowers in mid to late summer, with fruits in September; however, fruits are rarely produced (Penskar and Crispin 2013).

Habitat

The cress occurs anchored to the substrate in quiet waters of rivers and lakes, in sheltered bays of Lake Superior, and along muddy or mucky shores (Chadde 1999; Voss and Reznicek 2013). It usually occurs in full sun (Chadde 1999). It can grow in water to several meters deep (Borman et al. 1997). It may prefer spring-fed, cold waters (Voss and Reznicek 2013). Substrates are usually silty, muddy or sandy (Penskar and Crispin 2013). Associates include *Scirpus validus, Glyceria, Sparganium, Alisma plantago-aquatica, Sagittaria, Equisetum fluviatile, Ludwigia palustris, Polygonum amphibium, Typha latifolia,* and *Nuphar variegata* (Chadde 1999).

Distribution

The plant occurs in the central and eastern United States and southeastern Canada. Across the range, population size ranges from small to quite large, such as hundreds of plants (NatureServe 2013). Many records are historical with current status unknown and the plant has been extirpated from several states (NatureServe 2013).

Ottawa NF Distribution

No populations are documented on the Ottawa National Forest. The closest documented occurrence is in Marquette County, with other records in the UP from Luce and Mackinac counties (Penskar and Crispin 2013).

Threats

In Michigan, this species has apparently declined in the southern part of State due to deteriorating water quality and habitat conditions (Penskar and Crispin 2010). Sites remain in the Upper Peninsula, although seldom encountered. It is uncertain if the species is naturally rare, declining, or just difficult to find (Voss and Reznicek 2013). Draining and filling of wetlands and shoreline development are threats

for this aquatic plant. Water level and water quality changes can also be detrimental (NatureServe 2013).

***Nuphar lutea* ssp. *pumila* (*N. pumila, N. microphylla*) (yellow pond-lily)**
Family: Nymphaeaceae (water-lily)

This water lily has small yellow flowers and small oval leaves with deep sinuses. Plants are rhizomatous. Leaves may be submerged, floating, or emergent (Padgett 2007).

Life History
The plants appear from rhizomes in early summer and disappear again by late August. Pollinators include bees, flies, beetles and aphids (Padgett 2007).

Habitat
This perennial waterlily occurs in shallow to deep water of lakes and slow-moving streams and marshes (Chadde 1999; MNFI 2013). Associates include *Nuphar variegata* and *Brasenia schreberi*.

Distribution
This water lily occurs in the northeastern US and Canada, dipping into Illinois, Michigan, Minnesota and Wisconsin in the Midwest (USDA Plants 2013).

Ottawa NF Distribution
In the Upper Peninsula, this plant is only documented at five sites, three of which are within the Ottawa National Forest boundary (one on private land). Two recent discoveries are from beaver ponds. A 1920 record is from a lake.

Threats
Changes in hydrologic regime and water quality threaten this plant. For example, one Ottawa NF population occurs in a pond upheld by an old beaver dam. As the dam degrades with time, the pond is decreasing in size and the lilies are dying off.

***Panax quinquefolius* (American ginseng)**
Family: Araliaceae (ginseng)

Ginseng has single unbranched stems to 1.5 ft. The leaf is compound with five stalked leaflets, and toothed margins. Plants have one to four or more "prongs" depending on age. Flowers are small, greenish-white, with five petals in a round cluster. The fruit is red and berry-like (Penskar and Higman 1996; UWSP 2013).

Life History
Ginseng is slow growing. Seedlings have three leaflets. Juvenile plants have one "prong" or compound leaf with five leaflets. Two-prong plants are 3-6 years old, 3-prong plants are 7-9 years old, and four-prong plants are 10-11 years old (US FWS 2003). Plants do not reproduce until they are at least 4 years old (US FWS 2003).

Habitat
This herb occurs in rich, cool woods, on north-facing aspects, on slopes or into wetter woods and rich swamps, in full shade (Chadde 1999; Penskar and Higman 1996). Soils are often heavy, with thick leaf

mold or rotting wood (Penskar and Higman 1996). Associates include sugar maple, yellow birch, eastern hemlock, *Athyrium filix-femina, A. thelypteroides, Allium tricoccum, Caulophyllum thalictroides, Dicentra cucullaria,* and *Circaea alpina*.

Distribution
American ginseng occurs in the central and eastern US and Canada, but never in large populations (NatureServe 2013; USDA Plants 2013).

Ottawa NF Distribution
In the Upper Peninsula, ginseng is documented only from five sites on the Ottawa National Forest, all in Gogebic County. This is at the northern edge of the species' range. Recent revisits were not able to locate ginseng at four of the five sites.

Threats
Ginseng is harvested for medicinal purposes and past harvest likely contributed to its range-wide decline. Also, this species is thought to be actively sought by deer as forage, and over-browsing by deer has been implicated in its range-wide decline (Vander Zouwen and Warnke 1995). Ginseng is adapted to low light and canopy opening can be detrimental (US FWS Finding 2004). Seed production is low, seed mortality is high, a long term seed bank is not formed, and there is a long stratification period, all of which make it harder for ginseng to react to declines (US FWS 2003). In response to viability concerns, the Michigan Ginseng Act (Michigan Compiled Laws 1994a) restricts harvesting of wild ginseng in the State.

***Petasites frigidus var. sagittatus* (*P. sagittatus*) (arrowleaf sweet coltsfoot)**
Family: Asteraceae (aster or daisy)

Large arrowhead shaped basal leaves with white-hairy undersides and toothed margins appear in spring, following the flowers. Flower stems are hairy and have a cluster of whitish flowers at the top (Penskar et al. 1997).

Life History
This is a perennial with aerial shoots forming from underground rhizomes. The single, hairy, flowering stems appear before the leaves in the spring (Penskar et al. 1997). The plants can form large clonal patches.

Habitat
This herb occurs in swampy ground, ditches, wet meadows, sedge fens, swales, marshes, and bogs, usually in full or nearly full sun (Chadde 1999; Voss and Reznicek 2012). Associated species include cedar, tamarack, black spruce, *Alnus rugosa, Salix* spp., *Calamagrostis canadensis*, *Iris versicolor, Carex lacustris, C. lanuginosa*, and *C. lasiocarpa* (Chadde 1999; Penskar et al. 1997).

Distribution
This plant occurs across Canada and the northern US, reaching a southern limit in Michigan, Minnesota and Wisconsin (Penskar et al. 1997; USDA Plants 2013).

Ottawa NF Distribution
Upper Peninsula populations are from southern-tier counties and include three within the Ottawa National Forest, from Gogebic, Houghton, and Ontonagon Counties, from wetland edge habitats.

Distribution of this plant in the Upper Peninsula may be limited to relict colonies that established under different climate conditions after the last glaciation (Penskar et al. 1997).

Threats
Changes in the water regime and competition with exotics such as reed canary grass, common reed and purple loosestrife are threats.

***Phegopteris hexagonoptera* (*Thelypteris hexagonoptera*) (broad beech fern)**
Family: Thelypteridaceae (marsh fern)

This fern has single fronds on stems to about 2 feet tall. Fronds are broadly triangular, about as wide as long. The rachis is winged the full length (Cody and Britton 1989).

Life History
This is a perennial fern which forms spores and can reproduce rhizomatously (WI DNR 2013).

Habitat
This fern occurs in rich, moist woods, usually in full shade, often in moderately acid soils and often in rocky areas (Cody and Britton 1989; Smith 1993). Cody and Britton (1989) write that the fern usually occurs only on a local basis. Associates include *Carex intumescens, Gymnocarpium dryopteris, Arisaema triphyllum, Adiantum pedatum, Dryopteris* spp. and *Circaea* sp.

Distribution
This fern is widespread across the eastern US (USDA PLANTS 2013). Its primary range is to the south and east of the Ottawa National Forest (Smith 1993).

Ottawa NF Distribution
Phegopteris hexagonoptera occurs on both the Hiawatha and the Chequamegon-Nicolet National Forests, but is not judged to be at risk on either Forest. From the known distribution, this fern is at the northern edge of its range on the Ottawa, and would appear to naturally be uncommon here. Five populations are documented on the Ottawa, but one historic population in Sylvania Wilderness appears to be extirpated. Three of the sites occur in mesic northern forest while one is in mesic forest and along a well-used road edge.

Threats
Habitat destruction and canopy opening are threats to this fern.

***Piptatheropsis canadensis* (*Oryzopsis canadensis*) (Canadian ricegrass)**
Family: Poaceae (grass)

This grass has narrow leaves with inrolled margins. Infloresences are open and sparse. Spikelets have one flower, with a long curly awn. Flowering stems can reach 3 feet in height (Penskar and Crispin 2009).

Life History
This grass is a rhizomatous perennial producing seeds in mid to late summer (Penskar and Crispin 2009).

Habitat
This grass occurs in early successional areas in pine barrens (Penskar and Crispin 2009), or in dry sandy woods with jack pine, red pine, quaking aspen or white spruce (Chadde 1999, Voss and Reznicek 2012). It is usually in openings within the woods; these sites may be seasonally moist (Chadde 1999). It may also occur in cleared or burned sites, especially jack pine areas. It is more common to the north, and occurs locally south of Lake Superior (Voss and Reznicek 2012). Associates include the trees noted, bigtooth aspen, paper birch, *Comptonia peregrina, Vaccinium angustifolium, Gaultheria procumbens, Danthonia spicata, Agrostis hyemalis, Deschampsia flexuosa, Panicum xanthophysum, Hieracium* spp., *Fragaria virginiana*, and *Pteridium aquilinum* (Chadde 1999).

Distribution
This grass occurs in the northeastern US and central and eastern Canada, dipping into Michigan, Minnesota and Wisconsin in the Midwest (USDA Plants 2013). Michigan is at the southern edge of the species' range.

Ottawa NF Distribution
Nearby locations include Baraga and Marquette counties in Michigan and Vilas and Bayfield Counties in Wisconsin (Voss and Reznicek 2012, UWSP 2013). There are no documented populations on the Ottawa National Forest.

Threats
Wildfire or logging related soil disturbance and canopy opening enhances habitat for this grass (Penskar and Crispin 2009); conversely, fire suppression and succession can threaten persistence and habitat availability.

***Polygonum (Persicaria) careyi* (Carey's smartweed)**
Family: Polygonaceae (buckwheat)

This plant is erect, to four feet, with glandular stems. Leaves are lance shaped and alternate. Flowers are pinkish, small, in spikes (UWSP 2013).

Life History
This is an annual smartweed.

Habitat
This smartweed occurs in disturbed wet places such as ditches, burned wetlands, stream banks, and marshes, in full sun, generally with sandy or mucky shores (Chadde 1999; Voss and Reznicek 2012). Associated species include sedges (Chadde 1999).

Distribution
Its range includes the Great Lakes States, and northeastern US and Canada (USDA PLANTS 2013), often found only in local areas. It appears to be more common in Wisconsin than Michigan (UWSP 2013).

Ottawa NF Distribution
Polygonum careyi is documented from a single site in the Upper Peninsula of Michigan, discovered in 1987 as approximately five plants growing in a dry sandy part of a drying lake bed on private land along US Highway 2 within the Ottawa NF boundary. Revisits to this site have not been able to relocate the colony.

Threats
Changes in the water regime and competition with exotics such as reed canary grass, common reed and purple loosestrife are threats.

***Potamogeton confervoides* (Tuckerman's pondweed, algae-like pondweed)**
Family: Potamogetonaceae (pondweed)

This aquatic plant has fan-shaped branches with delicate leaves (Voss and Reznicek 2012). All leaves are submersed (NatureServe 2013). There is a long solitary peduncle for the flower/fruit spike (Borman et al. 1997).

Life History
Stems arise from a creeping rootstalk (Borman et al. 1997). Plants overwinter by rhizomes. Winter buds and seeds are other reproductive forms (Borman et al. 1997).

Habitat
This perennial pondweed grows in soft, shallow water and low pH lakes and ponds (Borman et al. 1997; Voss and Reznicek 2012). Associates include other pondweeds.

Distribution
The range is the northeastern US including Wisconsin and Michigan in the Lake States (USDA PLANTS 2013). It is considered rare throughout much of its range, including Michigan (Penskar 2009).

Ottawa NF Distribution
Populations are documented in the the eastern Upper Peninsula (Voss and Reznicek 2012) and in Wisconsin counties adjacent to the Ottawa (UWSP 2013). There are no documented populations on the Ottawa National Forest.

Threats
It is unknown if this species is in deline or is naturally uncommon. The species could be harmed by loss of water quality or changes to natural water chemistry (Penskar 2009).

***Prosartes (Disporum) hookeri* (drops of gold, fairy bells)**
Family: Liliaceae (lily)
Ottawa plants are variety *oregana*.

This is an erect perennial herb to over 2 feet. Alternate oval leaves with pointed tips are produced on forked stems (Higman and Penskar 1996c), with the plant appearance similar to *Streptopus* species, *Smilacina racemosa*, *Uvularia* species, and *Polygonatum pubescens,* all of which are common associates of the rare lily. The leaves have short hairs on the underside. One to three creamy white, 6-petaled flowers are produced at stem tips. The plant becomes somewhat woody-stemmed by fall (Higman and Penskar 1996c).

Life History
This is a rhizomatous perennial, sending up stems in spring to flower in May and June (Higman and Penskar 1996c).

Habitat
This lily generally occurs on north-facing slopes in shaded, moist, somewhat rocky mesic northern hardwood habitats. Plants are often located in small depressions that contain more moisture than surrounding microsites, and also are associated with permanent and intermittent rocky drainages. Mladenoff (1990) suggests that *Disporum hookeri* has been overlooked due to its similarity to its common associate herbs in the genera *Streptopus* (twisted-stalk), *Polygonatum* (Solomon-seal), and *Smilacina* (false solomon-seal).

Distribution
This lily mainly occurs in the Pacific Northwest, in British Columbia and Alberta, south to California and east to Montana and Idaho, with a disjunct segment in Ontonagon County, Michigan (Higman and Penskar 1996c).

Ottawa NF Distribution
In 1968 the species was discovered in Michigan, and remains known outside the main western North American range from only approximately nineteen sites in Ontonagon County, Michigan. Thirteen of the documented sites are on the Bergland and Ontonagon Ranger Districts of the Ottawa National Forest. In 2013, an as-yet unverified and undocumented population may have been found in Houghton County.

Threats
Threats listed in the Conservation Assessment include loss of protective snowpack during cold winters, deer herbivory, changes in canopy closure alteration of habitat, loss of pollinators, and invasive plants (Larson 2000).

***Pterospora andromedea* (woodland (giant) pinedrops)**
Family: Monotropaceae (Indian pipe)

The unbranched straight stems are 2-3 feet high, and pink-purple-brown, with no chlorophyll. Leaves are small and scale-like. Flowers are nodding on curved stalks, whitish, urn-shaped, occurring in June through August. There are gland-tipped hairs on stems so plants seem sticky (Higman and Penskar 1999).

Life History
The plant depends on its association with a mycorrhizal fungus that is also associated with a conifer tree; pinedrops plants have no chlorophyll for photosynthesis (Higman and Penskar 1999). Local monitoring and Higman and Penskar (1999b) suggest that plants of this species may not appear above ground every year.

Habitat
Pinedrops is found in conifer woods or mixed aspen-pine woods. Associates include fir, white spruce, red and white pine, paper birch, quaking and bigtooth aspen, *Vaccinium angustifolium, Juniperus communis, Pteridium aquilinum,* and *Lycopodium clavatum* (Chadde 1999).

Distribution
Pinedrops is primarily a western US species, with disjunct locations in the Black Hills and Great Lakes area, and scattered sites in Quebec, Ontario, and New England (USDA PLANTS 2013).

Ottawa NF Distribution
Pinedrops is documented from twelve sites on the Ottawa, mostly from the western Ontonagon Ranger District of the Ottawa NF, all on clay soils in partial to full shade. However, one site was found in 2008 to the east, near Prickett Lake, on sandy soil in shade, and one plant was found in 2011 from a rocky slope in the Trap Hills under white pine, red pine, and bigtooth aspen. Sites in Wisconsin are limited to the Lake Michigan shoreline (UWSP 2013).

Threats
Habitat changes which threaten either the conifers or the fungus can be detrimental to pinedrops.

***Pyrola asarifolia* (liverleaf wintergreen)**
Family: Pyrolaceae (shinleaf)

This short plant has rounded, dark green, leathery, shiny basal leaves and pinkish, urn-shaped dangling flowers on a nearly leafless spike (UWSP 2013; (Voss and Reznicek 2012).

Life History
This is a rhizomatous perennial, blooming in July and August. Reproduction is by rhizomes and seeds (Gucker 2007).

Habitat
This wintergreen occurs in "cedar swamps and other moist forests, peatlands, especially fens, and springy places; interdunal hollows and borders of shore thickets" (Voss and Reznicek 2012). Associates include *Aralia nudicaulis, Athyrium filix-femina, Cornus canadensis, Clintonia borealis, Dryopteris intermedia, Equisetum scirpoidesm Gymnocarpium dryopteris, Mitchella repens, Oryzopsis asperifolia*, *Mitella nuda,* and *Solidago flexicaulis.* This wintergreen can tolerate both sun and shade (Gucker 2007).

Distribution
The range includes much of the western and northern US and nearly all of Canada (USDA PLANTS 2013).

Ottawa NF Distribution
Populations are documented across the Upper Peninsula, including Iron and Houghton Counties near the Ottawa (Voss and Reznicek 2012), and in numerous sites in northern Wisconsin counties including Vilas and Forest Counties adjacent to the Ottawa (UWSP 2012). There are six documented populations on the Ottawa, mostly near creeks through conifer-hardwood forest in the Sturgeon River Gorge Wilderness.

Threats
Marked changes in light or moisture regimes may be detrimental to this plant.

***Pyrola minor* (snowline (lesser) wintergreen)**
Family: Pyrolaceae (shinleaf)

Lesser wintergreen is a small, evergreen perennial. This short plant (to 6 inches) has elliptical, dull, dark green, basal leaves and white, nodding flowers on a nearly leafless spike (UWSP 2012).

Life History
This is a rhizomatous perennial herb.

Habitat
Voss and Reznicek (2012) describe the habitat in Michigan as, "very local under conifers (cedar, jack pine) and at edges of alder or spruce-fir thickets, usually very near Lake Superior." The WI DNR (2013) describes the habitat as "acidic, conifer swamps dominated by black spruce, tag alder, tamarack, and balsam fir, often in areas with heavy Sphagnum moss cover".

Distribution
The range includes much of the western and northern US and all of Canada (USDA PLANTS 2013).

Ottawa NF Distribution
In Michigan, populations are documented from the eastern Upper Peninsula and Houghton and Keweenaw Counties (Voss and Reznicek 2012). Wisconsin sites are limited to Bayfield and Douglas Counties (UWSP 2013). There are no documented populations on the Ottawa National Forest.

Threats
Marked changes in light or moisture regimes may be detrimental to this plant.

***Ranunculus gmelinii* (Gmelin's buttercup; small yellow water-crowfoot)**
Family: Ranunculaceae (buttercup)

The leaves are dissected with submersed leaves thinner and emerged leaves wider (USDA PLANTS 2013). The small yellow flowers are five-parted, solitary on long stalks (UWSP 2013). Stems may be prostrate or floating (FNA 2013).

Life History
This is a perennial amphibious to aquatic plant. It can root at the nodes as well as produce seed (FNA 2013). It blooms in July to August with fruiting following into September (WI DNR 2013).

Habitat
This buttercup grows in areas such as "edges of rivers, streams, lakes, and ponds (in water and on banks); pools in bogs and cedar swamps" (Voss and Reznicek 2012).

Distribution
This buttercup occurs across Canada and in most of the western United States, dipping as far south as Illinois in the Midwest (NatureServe 2013).

Ottawa NF Distribution
Populations are documented in the southern and eastern Upper Peninsula (Voss and Reznicek 2012) and in several northern WI counties (UWSP 2013). One population was documented on the Ottawa in 2008, from a slough along a stream.

Threats
Changes in water regime or quality are the main threat.

***Ranunculus rhomboideus* (Labrador buttercup; prairie buttercup)**
Family: Ranunculaceae (buttercup)

This perennial upland buttercup has a basal rosette of ovoid leaves with scalloped margins. Flowers are small and yellow (Penskar and Crispin 2004).

Life History
This buttercup flowers in May. Seeds mature in July and may sprout the same year (Penskar and Crispin 2004).

Habitat
Across its range, this buttercup occurs in dry open woods, prairies, and rocky ridges in full sun, often south-facing (Chadde 1999; Voss and Reznicek 2012). In southern Michigan, it is a prairie species that occurs on sandy banks and grasslands (Voss and Reznicek 2012). In the Upper Peninsula, documented sites are restricted to dry ridge tops and rock outcrops, mostly on Isle Royale. Typical UP habitat is thin soil over rock on steep, southeast-facing slopes (Penskar and Crispin 2004).

Distribution
This buttercup's range includes much of Central Canada and the northern US (NatureServe 2013).

Ottawa NF Distribution
There are two extant populations on rock outcrop sites in the Trap Hills on the Ottawa NF. Another site from a smaller rock outcrop is no longer present, perhaps shaded out from shrubs and trees. All other known populations in the Upper Peninsula are on Isle Royale.

Threats
The main threat to the documented Ottawa population is recreation: hikers and rock climbers trampling the plant. Drought and climate change may also be threats.

***Salix pellita* (satiny willow)**
Family: Salicaceae (willow)

The alternate, lance-shaped leaves are velvety-hairy and whitish on the underside. Twigs are waxy-white (WI DNR 2013).

Life History
This perennial shrub blooms in May, and fruits in June (WI DNR 2013). Gleason and Cronquist (1991) noted that some portions of the species' range seem to lack pistillate or staminate plants. The resulting lack of seed production contributes to the viability concern for the species, although satiny willow, like other willows, readily produces vegetative sprouts.

Habitat
According to Voss and Reznicek (2012), this willow can occur on river banks, sandy shores and hollows in rock outcrops.

Distribution
This willow occurs in central to northeastern Canada, New England and Michigan, Minnesota and Wisconsin in the Midwest (NatureServe 2013).

Ottawa NF Distribution
Satiny willow is documented from a few locations in the Upper Peninsula, including two sites in Iron County and one in Houghton County on the Ottawa National Forest. All three of our sites are old and the records do not list a precise location. Recent attempts to relocate the populations have been unsuccessful.

Threats
Little is known about this species. MNFI recommends a status survey to obtain detailed habitat information, as well as protection of habitat and maintenance of a semi-open condition (MNFI 2013). Known threats include lakeshore development and riparian recreation (MN DNR 2013).

***Silene nivea* (evening (snowy) campion)**
Family: Caryophyllaceae (pink)

The medium-sized plant has opposite lance-shaped leaves and white, 5-parted flowers with an inflated base (WI DNR 2013).

Life History
This is a rhizomatous perennial flowering in early summer. It is insect-pollinated.

Habitat
The Wisconsin DNR (2013) describes the habitat as streambanks, streamside meadows, and deciduous forest margins near streams and rivers. The Ottawa site is an open beach with *Silene latifolia, Potentilla anserina, Equisetum fluviatile,* and *Salix* species.

Distribution
This pink occurs mainly in the Midwestern US (NatureServe 2013).

Ottawa NF Distribution
The first documented location in the State of Michigan is on the Ottawa National Forest, along the Ontonagon River on alluvial soil. An additional three populations have been located in the vicinity.

Threats
Successional changes in the riparian habitat and competition by other plants are primary threats. One site is threatened by the non-native invasive plant flat pea (*Lathyrus sylvestris*).

***Sisyrinchium montanum* var. *montanum (S. strictum)* (strict blue-eyed grass)**
Family: Iridaceae (iris)

Description
This plant has narrow stems, flattened like an iris, and winged. Flowers are 6-parted with blue petals (MNFI 2013). There are some questions about the taxonomy of this plant that, once resolved, could change the conservation priority (MNFI 2013).

Life History
Plants in this genus can reproduce by seed or by small buds near the base of the plant (VandeWater 2003). Bees are the usual pollinators (VandeWater 2003).

Habitat
S. montanum var. *montanum* occurs in dry to moist open sites such as meadows, ditches, fields, roadsides, lakeshores, forest openings, gravel pits, and stream banks. It can occur on sand, rock or clay soils, in full sun to partial shade (VandeWater 2003).

Distribution
As *S. montanum* var. *montanum*, this plant occurs in most of Canada, across the northern US and dips farther south in the central west (USDA PLANTS 2013). As *S. strictum,* this plant is considered a Great Lakes endemic, occurring in Michigan and Wisconsin (VandeWater 2003).

Ottawa NF Distribution
MNFI (2013) records populations in eight Lower Peninsula counties as well as Baraga County in the Upper Peninsula. The Baraga County record is near the Ottawa but is somewhat old and an attempt to relocate the population was unsuccessful. One population was recently documented on the Ottawa in a sunny clearing along a former railroad grade, surrounded by a forest of balsam fir, tamarack, white spruce, quaking aspen, and black cherry.

Threats
Succession is the main threat since this species needs an open canopy.

***Thelypteris noveboracensis* (New York fern)**
Family: Thelypteridaceae (marsh fern)

This is a medium-sized fern, with scattered single fronds emerging from creeping stems, and forming large patches. There may appear to be one to three fronds in a cluster. The fronds are long-diamond shaped, with small pinnae pairs toward base, tapering both ends, to about 2 ft. long. Foliage is delicate, not leathery or glandular (Hill 2006).

Life History
This is a clonal, rhizomatous fern. Vegetative reproduction is common and the fern can form mats of interwoven rhizomes, restricting growth of other species (Hill 2006). Spores mature in mid-summer (Hill 2006).

Habitat
This fern occurs in moist woods, often near streams, seeps, and swamps (Smith 1993). It does not occur in areas of dense shade or full sun (Hill 2006).

Distribution
The fern is widespread in eastern Canada and the US (USDA PLANTS 2013). Michigan is the western edge of this fern's range and the main fern reference, Flora of North America, vol. 2, shows the range only in the eastern Upper Peninsula (Smith 1993).

Ottawa NF Distribution
There are three documented populations on the ONF, all in mesic northern forest on the east side of the Ottawa. The largest population occurs in slightly lower and moister ground. At that site, the large clone of New York fern dominates, with *Dryopteris intermedia* on the edges.

Threats
Canopy changes allowing too much sun or too much shade can be detrimental (Hill 2006). Trampling is another threat.

***Tiarella cordifolia* (heartleaf foamflower)**
Family: Saxifragaceae (saxifrage)

This is an erect perennial herb, 4 to 14" tall. The leaves are basal, with 3-5 shallow, palmately divided lobes, like a maple leaf. The flowers are small and white, about ¼ inch wide, 5-parted. Flowers occur on a leafless, thin spike, up to 4" long (UWSP 2013).

Life History
This is a perennial blooming later in spring that can also vegetatively reproduce from rhizomes (WI DNR 2013).

Habitat
This plant occurs in deciduous and mixed woods, often in moister areas, and in swamps (Voss and Reznicek 2013). The WI DNR (2013) notes that locations in Wisconsin are very rich forest, and well drained.

Distribution
This is a species of the eastern US and Canada, reaching its western extent in the Midwest in Michigan and Wisconsin (where it is classed as endangered) (USDA PLANTS 2013; WI DNR 2013).

Ottawa NF Distribution
For several years, the only known population on the Ottawa was a very large one in the Ontonagon River valley, on clay. In 2012, a small population was found on South Bessemer Ranger District, on loam, near an old road. Populations are also documented in the central and eastern UP and in many LP counties (Voss and Reznicek 2012).

Threats
Changes to light and moisture regimes are the main threat.

***Utricularia geminiscapa* (hiddenfruit bladderwort, twin-stemmed bladderwort)**
Family: Lentibulariaceae (bladderwort)

Description
This is a small aquatic plant, with stems floating under the water surface. The flowers are yellow, two-lipped, and not all flowers open (cleistogamous). Leaves are alternate, finely divided, with scattered bladders (UWSP 2013).

Life History
This is an insectivorous plant, absorbing nutrients from tiny prey captured in its bladders. It can reproduce by seed and vegetatively.

Habitat
This plant occurs in "softwater lakes and bog pools" (Voss and Reznicek 2012).

Distribution
This is a plant of the NE US and Canada, ranging into the Midwest as far west as Wisconsin and Iowa (NatureServe 2013).

Ottawa NF Distribution
Populations are documented in Baraga County, the eastern Upper Peninsula, and scattered sites in the Lower Peninsula (Voss and Reznicek 2012). In 2012 the first population was found on the Ottawa, in a small pond in Ontonagon County. A second population was found in 2013.

Threats
Changes in water quality or hydrologic regime threaten this plant.

***Vaccinium cespitosum* (dwarf bilberry)**
Family: Ericaceae (heath)

This is a dwarf prostrate shrub forming clonal mats. The leaves are oval to round, small, broadest above the middle, with fine teeth. The flowers are pink and bell-shaped, single in the leaf axils (Penskar and Higman 2001). The fruit is a blue berry without the sepal crown of true blueberries.

Life History
Vegetative reproduction by stolons is common while flowering and fruiting may be sporadic (Penskar and Higman 2001). Dwarf bilberry is the host plant for northern blue butterfly, another Regional Forester Sensitive and state threatened species.

Habitat
Chadde (1999) describes the habitat as, "In open, fairly dry, rocky or sandy conifer woods and on rocky stream banks; in full sun to partial shade." Voss and Reznicek (2012) describe the habitat somewhat differently as, "In our area (Michigan), it grows very locally on fairly dry (or only seasonally wet) sandy soils, in openings among aspen and other hardwoods." Associates include *V. angustifolium, V. myrtilloides, Comptonia peregrina*, *Rubus* spp., *Carex pensylvanica, Pteridium aquilinum,* and *Cladina* lichens.

Distribution
This is a northern and western species, occurring in the Midwest in Michigan, Wisconsin and Minnesota (USDA PLANTS 2013).

Ottawa NF Distribution
There are seven naturally-occurring, documented sites on the Ottawa National Forest: four in small openings in jack pine barrens over rock in McCormick Wilderness; two from openings in aspen-pine habitat on clay soil, and one within mesic northern forest on clay soil. There are several other recorded sites in openings near the McCormick Wilderness (off the Forest). The Forest Service has grown plants from seed and planted them at ten new sites on the Ottawa; at 7-8 of these sites, the bilberries appear to be establishing well.

Threats
Fire suppression and succession, which allow the canopy to close, are threats as is competition from other plants.

***Viola novae-angliae* ssp. grisea (New England violet subspecies)**
Family: Violaceae (violet)

Legal Status; Coefficient of Conservation (C)
As *Viola novae-angliae:* Federal: none; Forest Service: RFSS; State: threatened. C: 10.

Global and State Ranks
As *Viola novae-angliae:* G4, NNR, S2 (NatureServe 2013).

Description
This stemless violet has narrowly ovate-triangular leaves with heart-shaped bases. There are hairs on the leaves, peduncles and petioles (Voss and Reznicek 2012). The flowers are blue. This subspecies differs from ssp. *novae-angliae* by having larger seed, more hairs and ciliate auricles (Voss and Reznicek 2012).

Life History
This is a perennial violet, flowering in early summer. This plant may be able to invade disturbed areas (NatureServe 2013).

Habitat
Subspecies *grisea* occurs in open grassy areas in or at the edge of jack pine stands. According to Gil-Ad (1997), this subspecies is apparently endemic to northern Michigan and Wisconsin, although the taxonomy remains unsettled.

Distribution
As *Viola novae-angliae:* This violet occurs in the NE US and Canada, extending into Michigan, Wisconsin, and Minnesota in the Midwest (USDA PLANTS 2013).

Ottawa NF Distribution
There are apparently only four known sites of this sub-species: three identified in Gil-Ad (1997), and one more verified by Dr. Ed Voss from the Ottawa NF in Houghton County.

Threats
Open jack pine stands are uncommon on the Ottawa NF and are vulnerable to ecological succession and perhaps fire suppression.

***Viola novae-angliae* ssp. *novae-angliae* (New England violet subspecies)**
Family: Violaceae (violet)

This stemless violet has narrowly ovate-triangular leaves with heart-shaped bases. There are hairs on the leaves, peduncles and petioles (Voss and Reznicek 2012). The flowers are blue.

Life History
This is a perennial violet, flowering in early summer. This plant may be able to invade disturbed areas (NatureServe 2013).

Habitat
In the Great Lakes States, this violet subspecies occurs in rock crevices along cold, rapidly flowing streams.

Distribution
As *Viola novae-angliae:* This violet occurs in the NE US and Canada, extending into Michigan, Wisconsin, and Minnesota in the Midwest (USDA PLANTS 2013).

Ottawa NF Distribution
There are apparently only seven documented populations of this subspecies in Michigan, most along the Escanaba River (MNFI 2013). There is one confirmed population on the Ottawa NF, and one observed previously but not confirmed and not relocated in recent searches.

Threats
Canopy closure and succession as well as competition with exotics are threats. Changes in water regime may also be detrimental. This violet is probably naturally rare due to limited habitat.

***Zizia aptera* (meadow zizia, prairie golden alexanders)**
Family: Apiaceae (carrot)

This herb grows to 3 feet tall, with branched stems. The umbellate flowers are yellow. Basal leaves are simple and heart-shaped at the base. Stem leaves are divided into leaflets (UWSP 2013; Voss and Reznicek 2012).

Life History
This perennial herb flowers in mid-summer. Pollination is typically by bees or flies.

Habitat
The plant occurs in open sites, dry to moist, in varied soil types, although it may be favored by calcareous soils (Farnsworth 2003). It tolerates full sun to light shade. In the greater part of its range it is a plant of tallgrass prairie (Farnsworth 2003). Other northern sites in Michigan and Wisconsin include an unusual complex of openings and cedar thickets over limestone till (Mackinac County) (MNFI 2013), an open glade in Bayfield County, and old burn area near a railroad grade within an extensive marshland with some areas of higher ground (Douglas County), sandy cutover jackpine woods (Douglas County), and jack pine barrens (Washburn County) (Wisconsin State Herbarium 2013).

Distribution
This herb has a widespread distribution across most of North America including all the Midwestern states (USDA PLANTS 2013).

Ottawa NF Distribution
Zizia aptera was discovered on the Ottawa NF in 2009, near a railroad grade and an historic town in Gogebic County. There may be some connection with the railroad bringing in seeds from prairie locations to the west, as well as starting track-side wildfires in the past that can favor prairie plants.

Threats
Fire suppression and succession resulting in canopy closure are detrimental.

Non-Vascular Plants

***Ahtiana (Cetraria) aurescens* (yellow ribbon lichen)**
This foliose lichen occurs on "trunks and branches of trees and bushes…in humid places in old-growth forests" (Wetmore 2002a). Typical Upper Great Lakes habitats include white cedar or black spruce swamps over 100 years old (Wetmore 2001). Wetmore studied this lichen in Minnesota and found it in stands with <10% to 80% overstory, on trees over 118 years old (Wetmore 2001). In Michigan, the lichen can apparently also occur in humid-mesic sugar maple-yellow birch-hemlock stands (PVA 2000) and black ash swamps (Wetmore 2002a). This lichen reproduces by spores only, and therefore can disperse relatively well (Wetmore 2002a). The Ottawa National Forest is at the northwest edge of the lichen's range (Hale 1979). There are four documented populations on the Ottawa National Forest, three from cedar-spruce swamps, including one cedar swamp in Redboat, and one from old growth hemlock-hardwoods in Sylvania.

***Anzia colpodes* (anzia lichen, black-foam lichen)**
This foliose, or leafy, lichen occurs on hardwood trees in deciduous forest (Brodo et al. 2001). According to Hale (1979), it "often grows high up on tree trunks". Ladd (2002) writes that it may be an old-growth dependent species, at least in some parts of its North American range. It has an eastern US range and the Ottawa NF is on the extreme western edge (Brodo et al. 2001). There are two documented populations in the Upper Peninsula, one in Luce County and one near Sylvania Wilderness on the Ottawa (MNFI 2011). Wisconsin has three historic sites (Bennett and Wetmore 2004).

***Caloplaca parvula* (firedot lichen species)**
This crustose, or crust-forming, lichen is typically found in black ash swamps, adjacent to or very near lakes, with a fairly open canopy and limited shrub layer and ground cover (PVA 2000). It may need older forests, but it grows on younger trees, usually 3-4" diameter, sub-canopy ash, although a site is known on red maple (PVA 2000). Older ash trees do not have suitable bark (PVA 2000). Due to its requirement for highly humid conditions it is typically found within 12" of the ground (PVA 2000). Sites are usually wet, with standing water in depressions (PVA 2000). *C. parvula* is known from northeast Minnesota near the Canadian border and from the eastern end of the Upper Peninsula of Michigan (Wetmore 2000). In 2004 a population was discovered on the ONF. Associates include black ash and sedges (PVA 2000).

***Frullania selwyniana* (liverwort species)**
This small, copper-colored liverwort grows on bark of white cedar (Janssens 2004) and perhaps also on bark of other conifers or on cliffs (Ley and Crowe 1999) in mesic areas. It has a life span of few to many years, high sexual reproductive effort, asexual reproduction rare, and large persistent spores (Janssens 2004). It is an eastern US/Canada endemic, restricted to glaciated areas with white cedar (Janssens 2004). Some records are from wetland cedar, but the one Ottawa population is within upland cedar forest. There are other Upper Peninsula records from Isle Royale and the Huron Mountain Club (Janssens 2004).

***Orthotrichum ohioense* (Ohio orthotrichum moss)**
This moss grows on the bark of trees (Crum 2004) in sheltered habitats. Crum and Anderson (1981) further describe habitat as "on the bark of hardwood trees, especially those with smooth and hard bark, in mesic forests, especially along streams, only rarely in the open". It has a moderate life span, sexual and asexual reproduction, small and persistent spores, competing well (Janssens 2004). It ranges through the eastern and northern US, and the Ottawa site is the farthest northwest known site

(Janssens 2004). One population is documented on the Ottawa, on smooth tree bark in mesic to wet, old aspen forest (Janssens 2004).

***Pylaisiadelpha tenuirostris* (pylaisiadelpha moss)**
Janssens (2004) writes that this moss occurs in a variety of sheltered habitats, including rock (usually acidic), trunks and bases of trees, rotten logs and stumps. Sites can be mesic to xeric (Janssens 2004). It has a long life span, low reproductive effort, small spores, competing well. Its range includes the eastern US. The first Upper Peninsula record is from Janssens' 2004 survey of the Ottawa, from an old-growth hemlock stand near Lake Superior.

***Schistostega pennata* (schistostega moss, goblin gold)**
This small moss has a luminous juvenile stage (protonema), allowing it to grow in habitats such as caves, cliff crannies, cavities in large tip-up mounds, and other dark places. It has a short life span, high sexual effort, no asexual effort, low age of reproduction, spores small and persistent (Janssens 2004). There is one documented population on the Ottawa (Crum 2004). There are seven other Upper Peninsula populations (Janssens 2005). Janssens (2005) describes the moss' distribution as rare and widely scattered circumboreal. The Ottawa is on the southern extent of the range.

***Stereocaulon pileatum* (snow lichen)**
This small lichen occurs on "siliceous rocks in sunny or partially shaded locations, often near lakeshores or waterfalls" (Brodo et al. 2001). The range is primarily northern New England with disjunct portions in the northwestern Upper Peninsula, the north shore of Lake Superior and the Great Smoky Mountains (Brodo et al. 2001). A population is documented from Isle Royale (Fryday et al. 2001) and one from the Ottawa's Trap Hills (Wetmore 2005).

***Sticta beauvoisii* (Beauvois' spotted felt lichen)**
Across its range, this foliose lichen occurs on mossy rocks and bark in the shade (Brodo et al. 2001). Its main range is the Appalachians, but a disjunct portion of range is mapped in the western Upper Peninsula and adjacent Wisconsin (Brodo et al. 2001). There is one Upper Peninsula record from a cedar swamp near Bobcat Lake on the Ottawa (Fryday et al. 2001). Six populations are documented in Wisconsin (Bennett and Wetmore 2004): three are in conifer swamps, one is on a rock face in a ravine, and two have no habitat information. Forested wetlands and rock appear to be the most likely potential habitats on the Ottawa.

***Usnea longissima* (beard lichen)**
This thread-like, pendant lichen hangs from trees in humid old-growth forests, usually near streams, lakes, or in bogs (Wetmore 2002b). Forest types are typically balsam fir, white cedar or black spruce, over 100 years old (Wetmore 2001). It may occur on younger trees where there is a nearby large and healthy population on old trees (Threatened Macrolichen Project 1996). It grows near the tops of the trees where there is sunlight (PVA 2000). It often has a patchy distribution, which has been attributed to its short dispersal distance that is not effective in fragmented forest (Threatened Macrolichen Project 1996). It reproduces mainly by thallus fragments, which are too heavy to move far on the wind (Wetmore 2002b). If a source population is not present nearby, the probability of colonization of the project area is greatly reduced although some birds utilize lichens for nest material and may perhaps help in dispersal. The Ottawa National Forest is at the southern edge of its range (Hale 1979). Eight populations have been documented on the Forest although some are historic records and the lichens have not been found in recent visits.

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Personal Communication

Skogerboe, J. 2/27/2013 e-mail to I. Shackleford and S. Trull, Ottawa NF about *Littorella uniflora* in Langford Lake.